1 OF 2

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DOE/EH-0078

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U.S. Department of Energy
Environment, Safety, and Health

Technical Safety Appraisal of the Naval Petroleum Reserve No. 1 Elk Hills - California

April 1989

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DE89 011331

DOE/EH--0078

U.S. Department of Energy

Environment, Safety, and Health

Washington, DC 20545

Technical Safety Appraisal of the Naval Petroleum Reserve No. 1 Elk Hills - California

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TECHNICAL SAFETY APPRAISAL

NAVAL PETROLEUM RESERVE NO. 1
ELK HILLS - CALIFORNIA

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TECHNICAL SAFETY APPRAISAL
NAVAL PETROLEUM RESERVE NO. 1
ELK HILLS - CALIFORNIA

TABLE OF CONTENTS

ACRONYMS

The following acronyms are used throughout this report:

ACM	Asbestos-containing Material
AE	Architect Engineer
AFE	Authorization For Expenditures
ANSI	American National Standards Institute
API	American Petroleum Institute
ASME	American Society of Mechanical Engineers
BLS	Bureau of Labor Statistics
BNA	Bureau of National Affairs, Inc.
BPOI	Bechtel Petroleum Operations, Inc.
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CTR	Contract Technical Representatives
CUSA	Chevron USA
DOE	Department of Energy
DOT	Department of Transportation
EH	Office of The Assistant Secretary For Environment, Safety and Health
EOC	Emergency Operations Center
EPA	Environmental Protection Agency
ERT	Emergency Response Team
ESD	Emergency Shut Down
ES & H	Environment, Safety and Health
f/cc	fibers per cubic centermeter
FY	Fiscal Year
HAZMAT	Hazardous Material
HPI	High Pressure Injector
H_2S	Hydrogen Sulfide
KCFD	Kern County Fire Department
KV	Kilovolt
LACT	Lease Automatic Custody Transfer
LPG	Liquefied Petroleum Gas
LTS	Low Temperature Separation
MSDS	Material Safety Data Sheets
MORT	Management Oversight Risk Tree
NBS	National Bureau of Standards
NCR	Nonconformance Reporting System
NDE	Non-destructive Examination
NDT	Non-destructive Testing
NFPA	National Fire Protection Association
NGL	Natural Gas Liquids
NOx	Nitrogen Oxide
NPR-1	Elk Hills Naval Petroleum Reserves No. 1
NPRC	Naval Petroleum Reserves in California
OSHA	Occupational Safety & Health Administration

PM	Preventive Maintenance
POC	Procurement Operations Center
PPM	Policy and Procedures Manual
psig	Pounds per Square Inch Gage
QA	Quality Assurance
RCRA	Resource Conservation and Recovery Act
RFP	Request For Proposal
SAR	Safety Analysis Report
SARA	Superfund Amendments and Reauthorization Act
SCBA	Self-contained Breathing Appartus
SOPs	Standard Operating Procedures
SPRO	Strategic Petroleum Reserve Office
SSDC	Systems Safety Development Center
UO-NPRC	Unit Operator-Naval Petroleum Reserves in California
UOR	Unusual Occurrence Report

I. INTRODUCTION

This report presents the results of the Technical Safety Appraisal of the Elk Hills Naval Petroleum Reserve in California conducted during September and October 1988. This appraisal is an application of the program that was initiated in 1985 to strengthen the DOE Environment, Safety and Health Program. Mr. N. Richard Glover of the DOE Quality Verification Division was Team Leader. The appraisal team was guided by Dr. Neal Goldenberg, Director, DOE Quality Verification Division. The team of qualified specialists from the Office of Environment, Safety and Health (EH) and support contractors gathered information over the course of about three weeks. The appraisal effort was guided by a set of performance objectives and associated supporting criteria.

The Naval Petroleum Reserves in California consist of two adjacent sites, Naval Petroleum Reserve No. 1 (NPR-1), Elk Hills, and Naval Petroleum Reserve No. 2, Buena Vista Hills. Both sites represent joint operations between the United States Government and private companies. This appraisal focused on NPR-1, an oil field covering some 48,000 acres in Kern County, California, which is located 30 miles from Bakersfield, jointly owned and operated by the Government and Chevron U.S.A., Inc. Under a 1944 plan, each participant shares in unit costs and production of oil and gas in proportion to the volume of commercially productive formations underlying the surface. The Government's overall average share of production for the unit field is 78 percent and Chevron's average share is 22 percent. Operating and financial decisions are made by an Operating Committee consisting of one government member and one Chevron member, each having an equal vote. The actual operation of the unit properties is the responsibility of the Federal Government. As of August 1, 1985, the unit field is operated by Bechtel Petroleum Operations, Inc. (BPOI).

The existing Elk Hills facilities for fluid production consist of tank settings, gas and oil/water gathering pipelines, gas plants, compressor facilities, lease automatic custody transfer units which meter the crude oil going to sales, and natural gas sales meters and pipelines, water injection and source wells, and gas injection pipelines and wells.

The principal safety concerns presented by operations at Elk Hills are fire, occupational safety and industrial hygiene considerations. Transportation and motor vehicle accidents are also of great concern because of the large amount of miles driven on more than 900 miles of roads. Typical operations involve hazardous materials and processing equipment such as vessels, compressors, boilers, piping and valves. The aging facilities, specifically the 35R Gas Plant (constructed in 1952) and many of the pipelines, introduce an additional element of hazard to the operations.

The findings and concerns developed by the appraisal team were discussed with the management of Elk Hills NPR-DOE, Chevron and BPOI in an exit meeting on October 7. This final report has been validated for factual accuracy with DOE/NPRC and BPOI.

II. PERFORMANCE EVALUATION

This is the first technical safety appraisal conducted for the Elk Hills Naval Petroleum Reserve, No. 1 (NPR-1). Bechtel Petroleum Operations, Inc. (BPOI) assumed responsibility for the site operations on August 1, 1985. In a letter to BPOI personnel, the new general manager noted that safety would be a high priority because the previous safety record was unacceptable. This appraisal found that although the safety practices and record have improved, the performance is but marginally acceptable. This level of safety performance reflects the safety improvement initiative by the contractor that has not filtered down to the working level and with subcontractors. The deficiencies identified by the appraisal team indicate a breakdown in management responsibilities to organize, direct, plan and assess safety. The management shortcomings are attributed not only to BPOI, but must include the Operating Committee (made up of a DOE and a Chevron representative), the DOE Naval Petroleum Reserves in California (NPRC) Office, and the DOE Fossil Energy program office.

The lack of a positive safety attitude at all levels, including sub-contractors, lack of safety training and lack of adequate supervision have contributed to an accident/incident rate for 1988 that is about 80 percent greater than the six-year average of members of the American Petroleum Institute. The accident/incident rate for the BPOI sub-contractors (about 50 percent of the on-site work force) is twice as high as for the BPOI work force. BPOI Contract Technical Representatives are responsible for subcontractor safety and health, as well as technical supervision, but have no specialized training or experience in safety and health principles or regulations. Inadequate independent reviews are conducted to assess the effectiveness of the BPOI health, safety and quality assurance programs. The deficiencies clearly indicate a breakdown in line management implementation and enforcement of the safety program. This is evidenced by the appraisal team categorizing about one-third of the appraisal concerns being failure to comply with some aspect of a DOE mandatory requirement, and another one-third as failure to comply with some aspect of a DOE recommended requirement.

The pervasive failure of BPOI and the Operating Committee to follow and enforce DOE safety policy raises serious questions about management commitment to safety. Many safety deficiencies exist that require resources to correct. Perhaps the most significant safety issue is the inability to fight a major fire. The resources to support necessary safety requirements have often been identified by BPOI but, in many instances, have not been adequately addressed by the Operating Committee or by the DOE. The effect of the actions by the Operating Committee and DOE management to defer or postpone requests to correct safety deficiencies exacerbates the perception of production first, and has resulted in an attitude culture in the work force that considers spills, leaks, procedure violations, etc., to be normal and acceptable activities.

III. REVIEW FINDINGS

Each of the Performance Objectives that were considered during the appraisal is discussed in this Section. Facility documents were reviewed; discussions were held with management, operations, technical support, and craft personnel; and routine activities and the physical condition of the facilities and equipment were observed. Observations from an emergency response exercise were included. The discussion that follows the statement of each Performance Objective addresses the more pertinent facts obtained, observations made, conclusions drawn, and presents concerns where applicable.

A total of 64 concerns are contained in the report which pertain to achieving compliance with some aspect of a DOE requirement or to achieving a greater level of safety. Each concern has been rated as to its seriousness in accordance with the rating system described in Attachment I. None of these concerns addresses a situation that presented a "clear and imminent danger", although 4 do require expedited attention by the contractor to ameliorate a significant risk. Three of the concerns (PP.1-2, PP.4-1, and PP.5-2) involve improvements to the emergency notification and response capability. The fourth (ST.6-2), involving off-site shipments using cylinders that were not in compliance with DOE/DOT requirements, had been terminated by Bechtel during the conduct of this appraisal. The concerns are categorized for seriousness in Attachment II.

A total of 63 Performance Objectives in 9 subject areas have been addressed by this appraisal. Concerns associated with 37 of these Performance Objectives have been identified.

A. PUBLIC PROTECTION

The Emergency Preparedness program at NPR-1 has been minimally established. An emergency response plan has been implemented, but lacks many of the elements required in emergency planning by the DOE Orders.

Most significantly, management has not made a full commitment to support an effective emergency preparedness program. This is evidenced in part by the fact that the emergency response team was made up late in 1987 with members assigned from a cross-section of departments, but seven of the 55 members listed on the September 15, 1988 roster have not attended any training sessions, and there have been discussions that some groups are too busy to participate. Further, the training program does not contain standards or administrative controls to ensure the training of emergency responders, as required by DOE orders.

Potential credible accidents are not discussed in safety analysis reports, so they are not used as the bases for planning and response. The event classification system includes only the two highest of the four classifications of accidents used throughout DOE, and in state and Federal response plans. No examples or guidelines are established for classifying events by severity, and provisions are not in place for reporting events above the alert classification to the DOE headquarters EOC as required by DOE Order series 5500.

The site depends on Kern County for fire department and medical emergency support, but first responder capability depends on the workers and their supervisors at the scene until arrival of the emergency response team. The established system does not ensure that trained first responders and a trained on-scene commander are on duty at all times. Notification of the emergency responders is sequential and typically takes from fifteen to twenty minutes. Once notified, response is quite rapid on dayshift, but on other shifts, weekends, and holidays the responders come from offsite. Key personnel are not provided with radio-equipped vehicles for rapid response.

A drill and exercise program is implemented and has been practiced quarterly, but the exercises are not realistically presented and controlled to ensure that maximum benefit is realized.

Alarm systems at NPR-1 are inconsistent among the areas and alert and evacuation alarms are not available in most areas. The site radio communications network has many dead spots, so it cannot be relied on to fully support emergency response for both operational and security events.

PERFORMANCE OBJECTIVE: The facility should not pose an added threat to the public as the result of operations permitting the release of hazardous materials beyond the site boundary.

FINDINGS:

- o A thorough review was made by the appraisal team of all discharges, including solid, liquid and gaseous materials from NPR-1. Specialists from Environmental Services demonstrated a good level of knowledge of all discharges from origination to release and/or reinjection. Although the Safety Analysis Reports did not include analyses of potential credible accidents, no situations could be postulated by the appraisal team which would pose an immediate threat to off-site populations and, therefore, require prompt notification of the public.
- o Many hazards exist at NPR-1 which require protective considerations for the onsite personnel.
- o Spills of crude oil and the associated water could make its way off the site, but would be less than catastrophic and unlikely constitute an immediate threat to human life.
- o Gas releases would be dissipated before reaching populated areas. (See Section PP.6)
- o Fire hazards would be localized to the facilities or wells on NPR-1 property.
- o Heavy smoke from a major fire may require coordination with local off-site authorities. (See Section PP.2)
- o Safety analysis reports do not include an analysis of possible hazards in terms of potential credible accidents or their consequences. Therefore, no specific preplanning exists for the potential credible accident(s), as required by Section 3 of DOE N 5500-3, dated March 23, 1988.

CONCERN (PP.1-1): Safety Analysis Reports for the NPR-1 facilities do not define potential credible accidents or their consequences to provide a basis for emergency planning as required by DOE Orders.

FINDINGS:

- o The emergency organization on normal dayshifts consists of the emergency response team (ERT) with the Safety/Health/Security Manager acting as the on-scene commander in charge of overall emergencies. Until his arrival, an ERT member in the area of the event is in charge.

- On backshift, weekends, and holidays, the same organizational structure is established. The difference is that the on-scene commander and most of the emergency ERT members must travel to the site from their homes (usually Bakersfield) which requires 30 to 45 minutes. In the interim, personnel at the scene would deal with the emergency.

- BPOI employees who are members of the ERT, including the on-scene commander, have to travel to the site when called. Because of rules concerning vehicle use, they must either use personal cars or go to the Trans-West vehicle lot and check out a car. In some cases, they would have to travel away from NPR-1 to get a vehicle. If they use personal vehicles, they have no radio contact while en route; if they go to the lot and check out a vehicle, they will have radio contact, but lose time.

- A large number of BPOI personnel are trained in use of the Burn-Pacs, which are provided throughout the site.

- Most operations personnel have received courses in basic first aid and cardiopulmonary resuscitation (CPR). Only specially-trained ERT members are qualified to operate the emergency response vehicle.

- No system is established to require that a person with emergency preparedness training will be available to take charge of emergencies at a given location until the on-scene commander and the ERT arrives.

- On backshifts and weekends, initial response to emergencies is to be made by the on-duty operations personnel led by either a Gas Operations Shift Foreman or a Production Operations Shift Foreman. These foremen are members of the ERT, but have not received training in command and control to be the on-scene commander.

- In some cases, such as sickness or vacation coverage, a non-ERT-trained operator may be assigned to serve as shift foreman. He could be the person initially in charge at the scene.

- Two BPOI personnel on the ERT maintain qualification as emergency medical technician, but they both work the dayshift.

- ERT training in command and control is not provided for all those who can serve as on-scene commander.

CONCERN: (PP.1-2) No system is established to ensure that personnel trained in emergency preparedness will be available to oversee immediate action and manage emergencies on backshifts, weekends, and holidays.

PERFORMANCE OBJECTIVE: The emergency plan and its supporting documents should describe an effective response to abnormal conditions.

FINDINGS:

- The emergency plan at NPR-1 is established in the Policy and Procedures Manual, Section 9.7, dated June 30, 1987. This policy requires an emergency response plan and the emergency response team (ERT), and assigns responsibility for emergency preparedness to the Manager of the Security Department. This position is now a part of the Safety/Health/Security Department.

- The details of the emergency preparedness program are included in the Emergency Preparedness Plan, dated March, 1987.

- The Emergency Preparedness Plan establishes an Emergency Planning Board to oversee the program and coordinate it with management and outside agencies. This board consists of three members; the Assistant General Manager, Technical Assurance, the Safety/Health/Security Manager, and the DOE Safety Manager.

- The Emergency Preparedness Plan has controlled distribution and revision, but provision is not made to ensure that the document is up-to-date with latest revisions or that each page or section is the latest approved version; e.g., the books are not identified as being part of a controlled system, pages are not identified as being part of a manual, not all pages are dated, and although a system is established to show revisions are incorporated, two books reviewed during the appraisal did not show records of revision.

- The emergency plan is reviewed quarterly by the Emergency Planning Board. No record of the quarterly reviews was made in the meeting minutes of that group.

- The emergency plan is for all NPR-1 facilities. Many DOE sites use facility-specific emergency plans as a sub-tier to the site emergency plan. In these, they include provisions for safe shutdown and evacuation during upset or emergency conditions.

- The emergency plan is not based on site-specific technical analysis of potential facility abnormal conditions or the site- or facility-specific credible accidents. Safety Analysis Reports are prepared for facilities, but they do not discuss potential credible accidents and their consequences. (See Concern PP.1-1)

- The emergency plan does not include provisions for personnel evacuation and accountability. The evacuation section of the plan had been developed but had not been issued.

- The emergency plan states that a notification will be made to members of the ERT. The method is covered in the Procurement Operations Center desk procedure, which is issued periodically to each ERT member but is not included in the emergency plan. Shortcomings in the notification method and system are discussed in Section PP.5.

- The makeup and organization of the ERT is discussed generally in the emergency plan. The ERT member list is not part of a formal control system, but is issued periodically to members of the ERT by the Safety/Health/Security Manager.

- The emergency plan includes only two of the four emergency classifications of DOE 5500.2A: site emergency and general emergency. The unusual event and alert classifications are not included. (See Concern PP.5-1)

- The emergency plan does not include or refer to implementing procedures as required by the DOE Order Series 5500. In fact, it specifically states that "the plan does not attempt to state specific procedures."

- The emergency plan does not provide a procedure or criteria for re-entry and recovery.

- No procedure is provided for intrusion or hostage situations in the emergency plan, nor does it refer to such security procedures.

- Examples of different severities of accidents are not included to guide a user of the emergency plan to aid in classifying accidents; e.g., giving examples of how different severities of fire might fall into each of the four classifications.

- Appendix 13 to the emergency plan treats Environmental Occurrences. This appendix uses definitions not in accordance with the plan or DOE Orders; i.e., OSC for on-scene commander versus Operational Support Center.

- Responsibility to coordinate with county, state and other Federal agencies is assigned in the emergency plan to the Safety/Health/Security Manager, but no procedure is provided. Most of this information is available, but not as part of the plan.

- The emergency plan does not refer to the NPR-1 Business Plan which lists all hazards at NPR-1. (This plan is used by the ERT in a shortened version). Also, it does not refer to the Spill Prevention, Control, and Countermeasure Plan which gives details of hazards and facilities. (See Section ST.3)

- The emergency plan includes policy for public notification by stating that the Director, NPRC, will provide information. No procedure, guidelines, or preformatted messages are provided for such information release, however.

- News media personnel would be directed to the Emergency Operations Center (EOC) pending arrival of the DOE Public Affairs representative. (See Section PP.4)

- No procedures or guidelines are provided for access control over evacuated areas. This problem was documented during recent incidents at the Low Temperature Separations Plant No.1 (LTS-1).

CONCERN: (PP.2-1) The Emergency Preparedness Plan is inadequate to support the emergency preparedness program. Further, the plan does not contain all the required elements of the DOE 5500 series of Orders.

PERFORMANCE OBJECTIVE: Emergency response training should develop and maintain the knowledge and skills for emergency personnel to respond to and control an emergency effectively.

FINDINGS:

- The training of NPR-1 personnel in emergency preparedness is limited to the emergency response team (ERT), which consists of 55 personnel from a cross-section of BPOI departments and DOE, and nine persons as dispatchers in the Procurement Operations Center (POC).

- ERT members receive training from a Trans West Security subcontractor and members of the Safety/Health/Security Department staff.

- An emergency preparedness Training and Operational Requirements section is provided in the Emergency Preparedness Plan as Appendix 19. This appendix requires that each ERT member "be able to satisfactorily demonstrate written and oral knowledge and proficiency in the subjects listed..." The training records do not provide documentation that such demonstration is made. Written examinations are not administered. Further, there is no standard or policy for the administration of the training program, including as provisions for lesson plans, instructor qualification, or rules for the administration of examinations.

- Some difficulty has been experienced with some departments, such as construction, who have not participated in the training or exercises because of work load. (See Section FP.6)

- Although the POC dispatchers had been trained in May 1988, the training was not listed in the training records.

- The training material is made available to all ERT members in a combination of several sessions at various times, but the system does not ensure or require that all members receive all training, or some minimum training.

- A comprehensive review of the various training records by the appraisal team showed that some members of the ERT receive virtually all presented training (primarily the Safety/Health/Security Department), but some members have not received either the initial ERT training or some training sessions since. No training session attendance documentation could be found for seven ERT members on the September 15, 1988, roster, plus all POC dispatchers.

- The established ERT training program does not provide centralized training records. Accordingly, no system exists for scheduling periodic retraining and keeping the necessary records for such retraining.

- No standards for acceptable performance are provided; no examinations are administered or records retained to show that individuals are satisfactorily trained and tested.

- ERT members can presently be placed on the call-out list without receiving the training to be an ERT member (the seven noted above are examples.

CONCERN: See MC.6-1.

FINDINGS:

- An exercise and drill program has been implemented at NPR-1. One exercise per quarter has been conducted. A review of the records from these exercises for the past year showed that improvements are being made with experience gained using the ERT system.

- An exercise was conducted for review and observation by the appraisal team. This exercise was held late on dayshift when the ERT was available. It consisted of the simulation of a tanker truck, carrying 15 percent hydrochloric acid, which crashed into gas and oil lines near the abandoned 3G gas plant. The driver was supposedly bleeding from hitting his head on the windshield and he may have sustained a neck injury. A brush fire was started by the accident, and the tanker was leaking acid onto the ground. The area chosen for the emergency is known for having many dead spots for radio reception. After the exercise, a critique was conducted to gain data from the experience and document necessary improvements.

- Prior knowledge of the scenario was limited to a few people. The exercise was not compromised in that regard.

- The exercise critique was documented and action items were assigned.

- The BPOI exercise critique resulted in action items being initiated to address the following:

  - Procurement Operating Center (POC) notification system improvements.

  - Identification of people at the exercise scene as observer, controller, or evaluator.

- Coordination of operations responders to assure proper expertise is made available to the scene.

- Provide communications for hazardous material suits.

- Improve radio communications; eliminate dead spots.

- Increase realism.

- Assure second POC dispatcher is called immediately.

o The appraisal team's assessment of the drill included the above items, but was more critical. It is noted that BPOI personnel had previously identified most of the problems discussed here, but they have not made good progress in getting them corrected. Further, some key safety issues were not discussed or identified as concerns during the critique. The more important issues identified by the team are:

  - One BPOI person was assigned to set-up and conduct the exercise. He was assigned this task the morning of the exercise, (he had not prepared the exercise). Set-up was not realistic; although a truck was used, it was not parked to simulate the accident. The driver (victim) was not made-up to simulate his injuries. He did not "play" the part. No controller was provided for persons working with the victim.

  - A one page scenario was prepared. It described the accident, but did not state objectives for the exercise.

  - The entire scenario was given to the first person to pass on the road. He was to radio or phone the existence of the emergency to the POC. Therefore, the POC received all aspects of the scenario on the first transmission. The person passing the message did not make a response to the accident, only to the message. He left the scene of an accident.

  - No additional controllers were available to provide information to the various players to keep the scenario on track.

- No BPOI evaluators were assigned.

- The victim was not checked for condition until 45 minutes into the exercise (he was supposedly bleeding). Two people attempted to check him (the person who called in the alarm after returning to the scene, and the Security Supervisor) but they were not provided information by a controller. Therefore, the information obtained was not given to the on-scene commander.

- Traffic control was not effective (due to lack of controllers). Trucks and cars drove through the scene. Traffic control was established starting 27 minutes into the event.

- The victim was removed from the truck and placed downhill from the spill. A wind shift then placed him downwind from the spill.

- Overall NPR-1 teamwork was poor - some ERT member groups (gas operations) did not support the exercise (partly because of communications problems).

- The critique did not address problems with command and control of the situation, particularly the importance of quickly assessing the condition of the victim from a life-support standpoint.

- Although it was announced at the beginning that the event was an exercise, messages were not prefaced or ended by clearly identifying them as part of an exercise as required by Section 8.C. of DOE N 5500.3, Section 8.c. dated March 23, 1988.

CONCERN: (PP.3-1) The emergency response drill and exercise program is not fully effective in presenting meaningful situations from which deficiencies and weaknesses can be identified and corrected.

PERFORMANCE OBJECTIVE: Emergency facilities, equipment, and resources should adequately support facility emergency operations.

FINDINGS:

- o Facilities for emergency response consist of an emergency operations center (EOC), activated in the security trailer, and an on-scene emergency control center, activated near the scene of the event.
- o The EOC is not established as a manned facility which services and provides support for the scene as stated in the 5500 series of DOE Orders. All ERT members go to the scene.
- o Alarm systems in use at the various areas of NPR-1 are not consistent. For example, at the truck loading area for propane a flashing red light indicates that it is safe to enter. At the gas plants a flashing red light means there is a fire. Other lights used as warnings are not consistent in all areas. General employee training does not include these alarms because they are inconsistent. (See Section FP.6)
- o An emergency evacuation siren has been installed at the administration area (11G) and plans are in place for installation of emergency evacuation alarms at the gas plant areas. At present, however, no evacuation alarms are provided at the gas plants or compressor stations.
- o It is understood that projects have been identified to make the alarms consistent and install evacuation alarms.

CONCERN: (PP.4-1) Emergency alarms for warning, protecting and evacuating personnel are not provided consistently at the NPR-1 site.

FINDINGS:

- o The communications capability of BPOI's Administration Branch of Acquisitions is used to support all emergencies. This facility provides the 24-hour dispatcher for the site. It is referred to as the Procurement Operations Center (POC).
- o No provision is discussed for backup facilities in event the EOC or POC is made unavailable. In the case of the POC, loss of the facility without backup arrangements would have severe consequences.
- o Communications resources consist of radios, telephones, and pagers. Three frequencies on a radio system are used in many BPOI vehicles with base stations at the POC and at the primary user areas. (These are used for normal business; channel one is used during emergencies). An emergency radio network consists of hand-held units with a base station in the POC telephones, both site network and public pay phones are available. Pagers are carried by key response personnel.

- o One pager failed to operate correctly during the exercise (as noted in the BPOI exercise critique).

- o Radio communications at NPR-1 are not consistent with standard radio use because the emergency plan specifies the phonetic alphabet as call designators for specific departments or groups; i.e., Bravo is drilling, and Hotel is construction. Therefore, the phonetic alphabet is not used to provide clarity in transmitting.

- o Radio communications at NPR-1 do not provide full coverage of the site, particularly in the eastern half. During the exercise, the emergency response team members had to move vehicles constantly to use the radios because of "dead" spots. This shortcoming seriously affected the ERT performance during the exercise, and is a constant problem for BPOI and Trans West Security personnel on a daily basis.

CONCERN: (PP.4-2) Radio communications systems are not adequate to support emergency response at NPR-1.

FINDINGS:

- o Technical support materials are not provided in the EOC (which is not manned in all cases), but they are provided at major sites and could be available to emergency responders through the representative from that discipline in event of an emergency.

- o The emergency plan does not include a list of equipment and resources available during emergencies. (See Section PP.2)

- o Emergency equipment is provided in many locations throughout NPR-1. A subcontractor is used to take a monthly inventory of this equipment. This subcontractor checks the inventory and signs and dates an attached tag to show the inventory was completed. All equipment was noted to have the tags and all were dated properly.

- o Emergency showers are not given documented periodic checks. During a recent incident involving use of an emergency shower for a burn victim, the shower had low flow. (See Section MA.4)

- o In some cases, the inventory list was posted to show what should be in a kit or at a location, but that was not common practice.

- o Seals were not provided on equipment or kits to show that emergency equipment was in a state of readiness and had not been used or disturbed since the last inspection.

CONCERN: (PP.4-3) The system for emergency equipment inventory control at NPR-1 does not ensure that emergency equipment is maintained in a state of readiness.

PERFORMANCE OBJECTIVE: Emergency assessment and notification procedures should enable the emergency response organization to correctly classify emergencies, assess the consequences, notify emergency response personnel, and recommend appropriate actions.

FINDINGS:

- Classification of emergency events at NPR-1 is not consistent with DOE requirements. Only two of the four event classifications are used, namely, site emergency and general emergency. The emergency plan does not provide unusual event or alert classifications. (See Section PP.2)
- Since DOE 5500.2A, Section 9.6 requires reports to be made to the Headquarters EOC for emergencies classified as alert or above, the reporting system would imply that all events classified at NPR-1 would be reportable.
- No reference is made to notifications to the DOE Headquarters Emergency Operations Center, nor are phone numbers provided. BPOI stated that they have been directed by DOE/NPRC to not make those notifications.
- Guidelines for examples of what would constitute typical classifications are not provided for event classification. Since potential credible accidents are not included in the safety review reports, that element of classification is also missing. (See Section PP.1-1)
- No correlation is provided in the emergency plan for relating various severities of measurements of hazardous material releases to an event classification level.
- No system of protective action guidelines is provided to aid the manager of an emergency in decision making (e.g., for what protective actions may be necessary for workers) during the various types and severities of emergencies that may occur.

CONCERN: (PP.5-1) Event classifications and reporting for accidents are not consistent with DOE orders; also, classification and protective action guidelines are not provided.

FINDINGS:

- During the exercise, no record or log was kept by or for the on-scene commander for purposes of reconstruction of events. A tape recording of the radio transmissions was made at the EOC, however, and the POC keeps a log of notifications.

- The notification system for the emergency response team consists of a call-out list in the POC desk procedure. This procedure is not part of a formal system. It is issued/updated periodically by the Acquisitions Department with input from the Safety/Health/Security Department. The call-out is by a combination of pager, telephone and radio. It takes at least 15 minutes to complete the notifications if the dispatcher is not interrupted.

- The POC emergency desk procedure states that required aid shall be directed by the caller and/or ERT member. The caller may not be capable of or trained in making that decision.

- A second POC dispatcher is to be called in to assist in the event of emergency (immediately available on normal day shift only). Even with some assistance, the system of call-out took 25 minutes during the exercise observed during the appraisal.

- Portions of the notification system depend on radio contact discussed in Concern PP.4-2.

CONCERN: (PP.5-2) The system in use for notification of emergency responders at NPR-1 takes excessive time.

PERFORMANCE OBJECTIVE: The impact on the environs from the operation of the facility should be minimized.

FINDINGS:

- All major points of potential release of hazardous material from NPR-1 were reviewed during the appraisal. It is to be noted that the DOE environmental survey which is to evaluate these releases in detail has commenced.

- The NPR-1 site has a comprehensive program to monitor and control spills as documented in the Spill Prevention, Control and Countermeasure Plan as amended May, 1988. From January 1 through August 31, 1988, there had been 321 minor spills and seven major spills at NPR-1 (where minor is defined as less than 100 barrels). This rate is consistent with the 1987 performance. Through this plan and the attendant actions, degradation to the environment is minimized and mitigated. An aggressive reporting and clean-up program is in place.

- Saline water, which is a byproduct of the producing wells, is reinjected at the site. The environmental aspects of such operations were not treated by this appraisal team.

- Gas releases at the site are possible from tank settings where relief valves are used for tank protection. This gas is "stacked" (released to atmosphere) at each site and no precise measurements of volumes are available. No public protection aspects are of concern because of the tank locations on NPR-1 and dispersion of the gas before it reaches populated areas.

- Gas releases from leaks at tank settings and compressor stations are monitored by BPOI's Environmental Services. Maintenance is ordered to correct noted deficiencies. Random sampling at the request of the appraisal team at one tank setting revealed no leaks.

- Gas releases from the gas plants are sent to flares. These are under Kern County permits for incineration. Sampling in the vicinity of the flares and downhill from the major propane storage tanks by Environmental Services at the request of the appraisal team revealed no residual gas buildup.

- Gas releases, even from major accidents at NPR-1, would be dissipated before reaching public population centers. The aspects of warning and protecting workers and other on-site personnel are discussed in Sections PP.1 and PP.4.

- Environmental Services maintains records of releases of all materials and works closely with the state and county on permits and reporting. Much of their work is anticipatory to meet changing regulations. A significant program is in progress to reduce oxides of nitrogen emissions from the large (over 500 horsepower) internal combustion engines.

- Environmental Services is cognizant of the monitoring of build-ups of hydrogen sulfide (for personnel protection) by the Safety/Health/Security Department. The build-ups thus far are not of great consequence, but they are expected to increase with oil reserve development.

- Security patrol vehicles and emergency response vehicles from the Safety/Health/Security Department are equipped with portable analyzers for hydrocarbon gas. These are calibrated monthly by a subcontractor. Several were checked; all were found to be in calibration. The security patrol (security supervisor) used his gas detector at the scene of the exercise.

- Solid and liquid hazardous waste is held and turned over to a subcontractor for disposal. (See Section ST.5)

- Three landfills for solid waste disposal are located on NPR-1. These are some of many areas receiving attention by the environmental survey, but they pose no immediate threat to workers or the public.

- Responsibility for monitoring and record-keeping of releases to the environment are the responsibility of Environmental Services, with input from operations and production groups. They provide personnel as members of the ERT and as specialists to assist in specific problems.

CONCERN: None.

B. PERSONNEL PROTECTION - OS AND IH

The safety and health program at NPR-1 has gained emphasis since 1985 and progress has been made toward the goal of full regulatory compliance and good practice implementation. This progress is demonstrated by (1) the development and conduct of training courses, (2) the addition of monitoring equipment and initiation of monitoring plans, and the (3) implementation of certain hazard control activities.

This period of activity represents a program growth, development, and implementation phase. Consequently, much of the effort performed by the Safety/Health/Security Department has been administrative in nature designed to establish policies, procedures, operational mechanisms, and functional resources. This administrative emphasis has limited the amount of time available for regular field oversight, surveillance and deficiency follow-up.

Line supervisors have enforcement responsibility for compliance with occupational health policies and procedures. Less than adequate performance in this capacity is apparent. The Safety/Health/Security Department has oversight and support responsibility for policies and procedures. Although regular audits are performed by Safety/Health/Security, the amount of time allowed for in-field oversight and verification is limited. This combination of line supervisor enforcement inadequacies and Safety/Health/Security oversight limitations, has led to a number of non-compliances with policy and regulation. Considered individually, most non-compliances are not of major consequence, but when analyzed as a whole, it is apparent that field activities are not well monitored.

Relative to subcontractors, safety and health policies are reviewed in pre-performance meetings. However, subcontractor safety records are not a key factor in contract award criteria, and no evidence was indentified that subcontractors have been substantially penalized for deficient safety performance. BPOI Contract Technical Representatives (CTR) are responsible for subcontractor safety and health as well as technical supervision, but have no specialized training or experience in safety and health principles or regulations.

The lost work case injury/illness experience at NRP-1 is significantly poorer than the average results of the production companies contributing to the API summary of occupational injuries and illnesses and fatalities in the petroleum industry for the years 1986-1987.

An example of fundamental weakness in the area of management commitment and support is the fact that the BPOI policies and procedures do not mandate the use of safety-toe foot protection for field drilling, producing, and plant activities as intended by OSHA and practiced by the major oil companies.

B.1 OCCUPATIONAL SAFETY

DOCUMENTED PROGRAM - OS.1

PERFORMANCE OBJECTIVE: The Occupational Safety Program should identify, evaluate, minimize and control those activities that may have adverse impacts on the safety and health of the public and employees or have potential for accidental loss and damage to government property.

FINDINGS:

- A documented safety program exists as evidenced by the UO-NPRC Safety and Health Policy and Procedures Manual (TOC-12, June 14, 1988) and the conduct of safety activities. This Manual consists of sections on Safety Policy, Functions and Responsibilities, Safety/Health Education, Safety Performance Recognition, Notification, Investigation and Reporting of Occurrences, OSHA Visits, Tagging and Clearance, Accident Prevention Tags, Personal Protective Equipment, Safety Audits and Inspections, Good Housekeeping, Safety Signs, Safety Color Codes, and Job Safety Analysis.

- Safety policies and procedures defined in the Safety and Health Manual are general in nature. The NPRC/BPOI Safety and Health Booklet supplements the Health and Safety Manual by providing operational guidelines.

- BPOI has in place a program for periodic safety inspections and reviews consisting of weekly walk-throughs by field supervisors, monthly audits by safety staff and, on an exception basis, special safety analysis reviews.

- The above inspections and reviews, individually and in combination, are designed to identify deficiencies and motivate improved safety performance; however, they are not all-encompassing and do not achieve compliance with safety policy. (See Sections OS.2 and OS.5)

- No formal program is in place whereby BPOI senior management routinely conduct pre-scheduled field safety inspections of selected operating entities, and document and distribute findings.

CONCERN: See MC.4-1 and MC.5-1.

SURVEILLANCE OF ACTIVITIES - OS.2

PERFORMANCE OBJECTIVE: Appropriate surveillance of activities should be conducted to maintain control of potential hazards to the public and employees and to minimize accidental losses and damage to government property.

FINDINGS:

- o A program is in place that includes safety performance requirements from subcontractors.
  - Bid solicitations for subcontract work include requests for safety performance criteria such as safety program, safety staff, past injury/illness experience, Experience Modification Rates (EMR), etc.
  - Safety performance criteria obtained in bid solicitation is not routinely used as a factor entering into the selection of the successful contractor. Award is normally determined solely based on low bid.
  - Oversight responsibility for field compliance of subcontractors to contract specifications is vested in the BPOI Contract Technical Representative (CTR). This responsibility also includes monitoring of subcontractor safety performance.
  - CTRs provide a monthly evaluation report of subcontractor performance to BPOI's contract administration. This includes evaluation of safety performance.
  - When safety performance evaluation is negative a "cure notice" is sent to the subcontractor.
  - No subcontractor has been terminated because of poor safety performance.

CONCERN (OS.2-1): Although subcontractor safety performance data is obtained in bid solicitations and is available from evaluation reports, it is not being used either as part of the procurement criteria for awarding work, or as part of the criteria for terminating a contract.

FINDINGS:

- o Contract Technical Representatives, although experienced in operational techniques, have no special training experience in safety principles, industrial safety or Federal and State safety regulations.

CONCERN (OS.2-2): Oversight of subcontractor safety performance is deficient because CTRs are not provided sufficient safety training to enable them to meet technical monitoring responsibilities.

FINDINGS:

- o NPR-1 1986-1987 lost work case injury/illness experience is significantly poorer than the average results of the production companies contributing to the API summary of occupational injuries and illnesses and fatalities in the petroleum industry for the same years. API lost work case incidence rates (injury/illness per 200,000 hours worked) average 1.06 for 1986-1987. This compares with BPOI experience of 1.7 and subcontractor experience of 3.0 for the same period. Major oil company experience is significantly better than industry averages.

- o BPOI/subcontractors injury/illness experience is also statistically anomalous in that lost work day cases and incidence rates bear such a high percentage to total recordable - over 70 percent - compared with an industry norm of less than one third.

- o BPOI policy for reporting of accident/incident occurrences at NPR-1 is to comply with DOE orders and OSHA requirements.

- o BPOI does not use, nor have at NPR-1, a copy of the Department of Labor BLS-OSHA latest reporting guide issued in 1986. Instead, they rely on the ANSI Z 16.4 standard of 1977 modified with Safety Department knowledge of changes obtained from BNA reports. In addition they also utilize DOE SSDC -7A, Guide to Classification of Recordable Accidents.

- o No case studies have been made of past years injury/illness classifications and reports, and no assessment has been made of compliance or non-compliance with the OSHA criteria.

CONCERN: (OS.2-3) The lack of the BLS-OSHA injury and illness reporting and classification guide at NPR-1 is indicative of a less than adequate working document library.

FINDINGS:

- o Walk through inspections performed during this appraisal revealed numerous violations of safety policy and good safety practice. Examples are: (1) a man was seen smoking within a fenced no-smoking area at the 25S LACT station; (2) a worker was greasing a swivel on a drilling rig approximately 15 feet above the floor without a safety belt; (3) a subcontractor employee was working in the 35R gas plant without a hard hat; and (4) classified electrical wiring at the shale shaker on a drilling rig was frayed and was repaired with friction tape, which is in violation of API RP-500B and OSHA 29 CFR 1910.399 for an explosion hazard atmosphere.

CONCERN: See IH.2-1 and IH.2-2.

PERFORMANCE OBJECTIVE: Official policies, directives and procedures should define the safety, health and quality assurance responsibilities and authorities, provide a statement of management participation and support, require compliance with DOE requirements and provide resources for overall program implementation.

FINDINGS:

- o BPOI has in place a program for scheduling and holding formal safety meetings. The program consists of holding one meeting per month for each work unit. Meeting topics and attendance are documented.

- o On alternate months, the meetings are prepared and led by a representative of the Safety/Health/ Security Department. Intervening monthly meeting are prepared and led by a member of the work unit, usually a supervisor.

- o Subcontractor personnel are encouraged to attend BPOI safety meetings.

- o Company supervisors up through superintendent level routinely attend some, though not all, of the work unit safety meetings held in the field.

- o There is no formal program in place encouraging managers above the superintendent level to attend a portion of these field safety meetings.

- o The policy for safety glasses states that "eye and/or face protection" must be worn while working in locations where "there is a risk of receiving eye injuries." (Section 12.3, 1220-003 of the Safety and Health Policy and Procedures Manual). This policy is highly interpretive and ineffective. At no location was a posting seen listing "Eye Protection Required." For example, the laboratory is certainly a location where injury could occur from acids/bases/corrosives, yet no posting exists for eye protection. Reportedly, protection is used when working with chemicals. However, someone in the same area who is still at risk would not be required to wear protection. Similar circumstances exist in other areas for both mechanical and chemical injury hazards (e.g., maintenance areas, shops, general plant areas, etc.).

- o BPOI safety and health policy for Personal Protection Equipment and Apparel (12.2, 1220-003 Foot Protection) requires that all NPR-1 employees who work in or visit field locations wear a sturdy leather work shoe or boot. No casual type sport shoes sandals, tennis shoes, etc., are permitted. This policy also applies to subcontractors.

- Safety toe footwear meeting the requirements and specifications in ANSI Z 41.1 as required by OSHA General Industry Standards 1910 Section I, are not required by BPOI and such compliance is not observed at NPR-1.

- Since February 1987 there have been some 30 accidents at NPR-1 involving slips, trips, falls, items dropped on feet and lower legs, twisted ankles, broken bones, etc. Sturdy work boots with safety toes would have eliminated or lessened the consequence of some of these injuries.

- Since World War II it has been customary for field employees in the drilling and production industry, including gas plant operating and maintenance personnel, to wear hard-toe safety work boots.

CONCERN: (OS.3-1) BPOI does not meet the intent or the spirit of the Federal Occupational Safety and Health Act in regard to Personal Protective Equipment, specifically safety toe shoes and glasses.

PERFORMANCE OBJECTIVE: Management control systems should be in place to assure that safety and health requirements are effectively carried out in the siting, design, procurement, construction, operation, maintenance, modification and decommissioning phases of the life cycle of a project or facility.

FINDINGS:

- The health and safety role in design control is stipulated in the UO-NPRC Policy and Procedures Manual, Design Control #1300-205:

  - As soon as preliminary engineering commences preparatory to the Authorization For Expenditures (AFE), a Project Execution plan is prepared that includes a safety plan if the project is sufficiently complex that the existing standard safety procedures are inadequate.

  - Concurrently, an assessment of safety permits and requirements is made by the Safety/Health/ Security Department. This might include local (BPOI) or State permits for fire, work entry, trenching, confined space, scaffolding, pressure vessels or crane certification.

  - Following the completion of basic design, review meetings are held (with Safety) at 30 percent, 75 percent and 100 percent completion of design. Conference notes are written. Health and Safety must sign off at the review prior to construction (100 percent) or the DOE won't approve.

  - The health, safety and fire protection staff play an active role in the preparation of the Request for Proposal (RFP) and the selection of the contractor (See Section OS.2). The specifications must be signed off before the RFP goes to bid.

  - In the case of small projects, monthly inspections are conducted on a random basis. Large projects may be inspected weekly, or even daily.

  - The Health-Safety staff participates in the "final job walk" and contribute to a check sheet or "punch list" of items. However, this is not a readiness review but rather a check to see if the subcontractor has met the terms of his contract.

  - Health-Safety must sign off before start-up.

- For projects over $500,000, a Safety Analysis Review Schedule Sheet is maintained. This sheet has 12 steps, from Project Definition to Job Walk. Completion of these steps when accomplished is noted in the monthly cost-plus-award-fee compilation.

- No BOPI in-house mandatory engineering standards manual concerning the design requirements of field producing and gas plant processing and storage facilities and installations is available to the Health and Safety staff to provide uniform and consistent guidance to the design and review process. Design engineers use "applicable" consensus and industry standards and recommended practices. BPOI does not have a guide document listing the "applicable" standards to be observed on different type and category projects including special design requirements not covered by consensus or industry standards.

- BPOI does have and use Chevron's Guidelines for Internal Fire Safety and Health Inspections which contain standards for walkways, handrails, safety showers, etc. BPOI is also in the process of developing and compiling process piping standards for use at NPR-1.

CONCERN: (OS.4-1) The Safety and Health Department does not have the benefit of a standard design criteria manual to assist their construction reviews and field inspections.

IDENTIFICATION AND CONTROL OF HAZARDS - OS.5

PERFORMANCE OBJECTIVE: The Occupational Safety Program should assure prompt identification, evaluation and control of safety hazards in the work place and readily accommodate changing circumstances.

FINDINGS:

- o BPOI instituted in 1986 a comprehensive Non-Destructive Testing (NDT) program to assure the integrity of all pressure vessels at NPR-1.
- o 1624 vessels were surveyed using ultrasonic methods. Approximately 100 were identified as questionable and further surveys eliminated all but six of these vessels from having problems that would affect their integrity. Of the six not eliminated, five were de-rated and one was retired.
- o There are approximately 80 vessels at NPR-1, most of which are in the gas plants, that have not yet been tested because they are encased in asbestos insulation. A vessel rupture and hydrocarbon vapors discharge in the gas plants process areas could result in a severe conflagration. The initial NDT program envisioned that testing of these vessels would coincide with another proposed program which was scheduled to remove the asbestos from these vessels. This removal program has been deferred.
- o A revised Non-Destructive Testing program has been planned and proposed (but not yet approved) to inspect these vessels in place. It will require drilling of 1200 holes in asbestos insulation at a cost of $140,000 for the total program (NDT plus asbestos drilling).

CONCERN: (OS.5-1) Delay in the Non-Destructive Testing (NDT) program for some 80 vessels results in operation of the gas plants under conditions of uncertainty.

FINDINGS:

- o BPOI has a policy covering well servicing and drilling operations which states that for permanent type well anchors, representative pull tests shall be made and records maintained. In addition, permanent anchors shall be visually inspected prior to each use.
- o Within the past several months a spot test of anchor integrity was made at NPR-1 with the pull testing of 100 anchors. All were pulled to 14,000 pounds per API recommendations. Three of the anchors tested failed the test directly and 25 others were identified to be damaged.

- o A routine program to assure the integrity of all NPR-1 anchors prior to use by a well servicing unit has been prepared, but has not yet been approved for implementation.

CONCERN: (OS.5-2) A program for routinely assuring the integrity and capability of permanent type ground anchors prior to use by well servicing units is not in place at NPR-1.

FINDINGS:

- o The LTS-1 and LTS-2 Gas Plants each contain two large (approximately 8'X30'x12' high) hot oil (therminol) furnace type heaters.
- o These heaters are gas fueled and of the natural draft type.
- o The operator actuated starting panel for each heater is located approximately five feet from the end of the heater.
- o The programmed light off procedure includes a three minute purge time delay to pilot ignition relying on natural draft to clear any flammable vapors that may be in the fire box. Numerous severe fire box explosions in the gas industry have resulted from the ignition of unpurged vapors consequent to malfunction of controls or other equipment. (See Section FP.2)

CONCERN: (OS.5-3) The effectiveness of natural draft purging on the LTS-1 and LTS-2 therminol heaters cannot be assured.

FINDINGS:

- o Housekeeping and cleanliness observed varied by location indicating inconsistent policy and practice. Examples include (1) 33S compressor station was very clean and oil-free at least on steps and walkways, (2) 36R compressor was leaking lube oil and glycol, (3) 17R compressor station had considerable oil leakage collected on skids (no effort to control this leakage was apparent, and an open pit of crude oil was present with no means of recovery), and (4) LTS-1 compressor station had substantial oil on walkways and steps (oil deposits on walkways and steps are a tripping/falling hazard and oil spills are a fire hazard).
- o Electrically unclassified lighting in the 35R Gas Plant in hazardous process areas is an ignition hazard.
- o Adjacent to the Cleveland drilling rig No.1, the earthen reserve pit is approximately twenty feet deep with vertical banks. The area was not barricaded and represented a definite falling and injury hazard. Earth banks showed evidence of cracking and impending failure.

- Classified electrical conduit at the shale shakers motors on the Cleveland No. 1 drilling rig was damaged and repaired improperly. (See Section OS.2)

CONCERN (OS.5-4): Readily identifiable safety hazards are not expeditiously corrected and/or controlled.

COMMUNICATION OF HAZARDS TO EMPLOYEES - OS.6

PERFORMANCE OBJECTIVE: Facility personnel should be adequately informed of safety hazards they may encounter in their work environment.

FINDINGS:

- Postings of safety hazards in field and plant areas are inconsistent/incomplete or in some cases lacking altogether. See Section OS.3 relative to "Eye Protection Required" postings. See Section IH.6 relative to "Hearing Protection Required" postings.

- BPOI has in place an incentive/award policy for employees intended to recognize good safety performance, promote safety consciousness and motivate their efforts to work safely on an ongoing basis.

- This policy calls for both individual employee and group employee recognition and awards for exemplary or meritorious performance or actions.

- Exemplary or meritorious performance is described as not sustaining or causing another person to incur one recordable injury/illness case which is determined to be preventable by the employee, or injured employee within the unit for the case of unit recognition.

- Safety programs, which experience greatest success over time are based on the principle that all injuries are preventable and that supervisors responsible for the well being of employees cannot be effective without accepting this principle.

CONCERN (OS.6-1): The use of the term non-preventable in regard to injuries/illness can be misinterpreted by supervisors and operators and be counterproductive to the overall safety program.

B.2 INDUSTRIAL HYGIENE

DOCUMENTED PROGRAM - IH.1

PERFORMANCE OBJECTIVE: The Industrial Hygiene Program should identify, evaluate, minimize and control those activities that may have adverse impacts on the health of the public and employees or have potential for accidental loss and damage to government property.

FINDINGS:

- o A documented health and safety program and industrial hygiene component exists as evidenced by the UO-NPRC Safety and Health Policy and Procedures Manual (TOC-12, June 14, 1988) and the conduct of safety and health functions.

- o The Safety and Health Policy and Procedures Manual is a general policy document which contains little site-specific operational detail relative to NPR-1. The Manual is not supplemented by any Standard Operating Procedures (SOPs) which would define implementation and execution details for NPR-1.

- o Chemical inventories and hazard information in the form of Material Safety Data Sheets (MSDS) are compiled and available for review and reference. (See Section IH.6 for details.)

- o Hazard evaluation is performed via the conduct of (1) three scheduled audits per month for specific operations (performed by the Safety/Health/ Security Department), (2) four joint compliance inspections per month (performed jointly by the Safety/Health/Security Department and line supervisors), (3) 10-15 spot checks per month (performed by the Safety/Health/Security Department). See sections IH.2 and IH.5 for an assessment of the effectiveness of these audits/inspections.

- o No personnel exposure monitoring for chemical hazards (except hydrogen sulfide) has been performed to date by the Safety/Health/Security Department for either BPOI or subcontractor personnel. Therefore, the Safety/Health/Security Department does not generally use this tool in either hazard assessment of hazard control mechanisms. Some monitoring has been performed by subcontractors for subcontractor personnel during asbestos removal operations and chromium site remediation.

- o No personal noise exposure monitoring has been performed. Area noise monitoring has been performed in the past; however, the program is not complete and is not repeated annually. (See Sections IH.2 and IH.5)

- Hazard controls have been partially implemented and have included (1) for some operations, use of automated bulk chemical injection rather than manual feed from drums or other containers, (2) partial substitution of chlorinated solvents with non-chlorinated alternatives, and (3) hazardous waste remediation program implementation. See Section IH.5 for further details. No hazard controls have been implemented or are planned for noise abatement with the exception of the use of hearing protection.

- Personal protection equipment (PPE) inclusive of respirators, disposable protective clothing (for hazardous waste and asbestos abatement), hard hats, and hearing protection are available.

CONCERN: See IH.2-1, IH.2-2, IH.2-3, IH.2-4, IH.5-1, IH.5-2, IH.6-1, IH.7-1.

PERFORMANCE OBJECTIVE: Appropriate surveillance of activities should be conducted to maintain control of potential hazards to the public and employees and to minimize accidental losses and damage to government property.

FINDINGS:

- Despite the audits and inspections conducted by the Safety/Health/Security Department (see IH.1) as well as supervisory enforcement activities, repeated non-compliances were found during walkthroughs conducted during this appraisal, including the following: (1) two of five workers in the LTS-1 compressor station were not wearing hearing protection, (2) 130 of 190 drums inspected in LTS-1, LTS-2, 35R, 33S and other areas were not properly labelled, and (3) a drum of 1,1,1-trichloroethane was found in LTS-1 despite a policy to remove this chemical from the site. These deficiencies are elaborated upon later in this section of the report.

CONCERN (IH.2-1): Field inspections and policy enforcement performed by line supervisors are not adequate to assure compliance with safety and health policies and procedures.

FINDINGS:

- The industrial hygiene program is mostly administrative in nature such as (1) MSDS compilation, (2) California Proposition 65 reporting, (3) audiometric testing coordination, (4) Superfund Amendments and Reauthorization Act (SARA) Title III compliance, and (5) training. Field evaluations through audits, inspections, walkthroughs, and visual/exposure monitoring were limited. In 1988, no chemical handling audits were conducted. Many chemical handling operations (i.e. chemical handling for water treatment) have not been visually monitored or reported upon.

CONCERN (IH.2-2): Oversight of field operations by Technical Assurance is inadequate.

FINDINGS:

- To date, no personal exposure monitoring for chemicals (except hydrogen sulfide H_2S), asbestos or noise has been conducted by the Safety/Health/Security Department. Personal monitoring capability for chemical exposure has only recently been added with the purchase of five air sampling pumps (September 1988). Noise measuring equipment is not available. Since no monitoring has been performed, no database for exposures exists. Therefore, personal exposure to chemical and noise hazards is unknown.

- Some area monitoring has been performed. For example, a good awareness exists that H_2S exposure potential is

increasing due to waterflooding operations. New H_2S monitoring equipment has been purchased. Tanks and areas known to have H_2S are monitored and are posted. This process was in evidence at 25S LACT where H_2S up to 100 ppm was found in tanks. A work order for posting was prepared in July 1988, and the area was posted.

- o Monitoring for oxygen deficiency and explosive atmospheres is performed for confined space entry.

- o Gas products have been analyzed for benzene and have been found to contain between 487 and 2,953 ppm (up to 0.2953 percent). Oil products have also been analyzed and have been found to contain between 10 ppm and 3,653 ppm benzene. No air monitoring has been performed for benzene. With the recent acquisition of sampling pumps, benzene monitoring is being planned. The OSHA benzene standard (29 CFR, 1910.1028) requires personal monitoring beginning on September 12, 1988, for products containing greater than 0.3 percent benzene, and on September 12, 1989, for products containing greater than 0.1 percent benzene. The gas plants are subject to this standard, but oil and gas drilling, production and servicing are exempt.

- o An asbestos identification program is in evidence. The 35R gas plant and certain areas of piping (e.g. under roadways) have been surveyed for asbestos-containing material (ACM) which has been confirmed. When suspect materials are found, bulk samples are collected and analyzed. No air monitoring has been performed to date in the general areas of 35R or at roadways (except that, when abatement projects were performed, subcontractors did perform air monitoring.)

- o No monitoring has been performed for naturally-occurring radiation which can accumulate in pipe scale or on filters. Reportedly, a monitoring program is being planned. Some dosimetry is performed for radiography operations.

CONCERN: (IH.2-3) No comprehensive personal exposure monitoring program has been established; therefore, exposures to many physical and chemical hazards are unknown.

FINDINGS:

- o The BPOI occupational safety, security and health program performance is subject to a monthly evaluation under the Cost-Plus-Award-Fee procedure. Five percent of the award fee, based upon an average 3-month rating, is at risk in this category. Seven program elements are judged for effectiveness.

- Monthly Accident Frequency Rate - for BPOI employees
- Monthly Accident Frequency Rate - for sub-contractor employees
- Preventable Vehicle Accidents
- Safety Education
- Internal Review
- Management of Security Subcontractors
- Significant Activities/Actions Impacting the Reserve Safety Program in a positive or negative manner.

o Programs to abate hazards do exist for certain areas while none exist for others. Examples are (1) a toxic material substitution effort was conducted to eliminate 1,1,1-trichloroethane; (2) asbestos abatement planning is underway for the 35R gas plant; (3) hazardous waste assessment and remediation is underway for sites contaminated with chromium, arsenic, and volatile organics. (4) a PCB transformer phase-out program is evident; (5) no noise-abatement program is evident; and (6) automated bulk chemical injection systems are in place for many areas (e.g., 35R boiler water treatment) but not others (e.g., 35R cooling tower water treatment).

o The UO-NPRC Safety and Health Policy and Procedures Manual contains a section on Occupational Noise and Hearing Conservation (Section 12.3, 1230-002). Procedures applied at the site do not comply with this document as follows: (1) Contrary to Part G.1.a., all elevated noise areas have not been monitored (annual monitoring is not performed for any area, and postings are not consistently made); (2) relative to Part G.1.d., the requirements for "maximum allowable noise exposure level for NPRC employees" of 90 dBA (decibels, A scale), independent of time, is not followed; (3) relative to Part G.3.a., no evidence of engineering or administrative controls was found to reduce noise exposure; and (4) hearing protection devices are not worn by all employees in posted areas as referred to in Part 3.b.1. The policy complies with OSHA 29CFR, 1910.95, Occupational Noise Exposure, but is not followed in all respects.

o Noise monitoring (area type) was performed several years ago at most major facilities such as LTS-1 gas plant, LTS-2 gas plant, High Pressure Injector (HPI), 33S compressor station, 35R gas plant, and others. Readings were recorded on blueprints.

- Noise monitoring has never been conducted at a number of locations including 17R waterflood, 33R compressor, temporary Nitrogen Oxide (NO_x) compressor, steam injection project, 33S waterflood, 4-3G compressor, and 2-3G compressor.

- No personal noise monitoring has been performed and no capability (equipment) is in place for personal monitoring.

- Noise monitoring is not repeated annually as specified in the UO-NPRC Health and Safety Policy and Procedures Manual, Section 12.3, 1230-002. Noise monitoring is not performed (repeated) whenever a change in "production, process, equipment, or controls" is implemented which is in violation of the OSHA Occupational Noise Standard 1910.95, paragraph (c)(3). As an example, gas compressor air intakes at High Pressure Injector have been modified as part of the Nitrogen Oxide suppression effort and noise levels have reportedly increased. The area was noted to have high noise levels suspected to be well above the 99 dBA shown on the blueprint.

- Engineering controls for noise reduction are either not in evidence, or are poorly designed. For example, operator booths were constructed in LTS-1 and LTS-2 compressor stations. However, they were not sufficiently sound-insulated and noise levels remain high enough to require hearing protection when inside. In addition, compressor intakes were modified at HPI for NOx suppression. However, the design did not consider noise level effects or control.

- Posting of noise areas is both inconsistent and incomplete. See Section IH.6 for examples.

- The practice of requiring hearing protection is inconsistent. For instance, operators at LTS-1 and LTS-2 had different interpretations of where hearing protection was to be required and enforced. LTS-1 operator stated protection was enforced only in the compressor station while LTS-2 operator stated enforcement was plant-wide. The Safety/Health/Security Department maintains that enforcement should be plant-wide.

- Enforcement of hearing protection requirements is either not conducted or is ineffective. Compressor stations were inspected at 33S, LTS-1, LTS-2, 35R, and HPI. A total of 11 men were observed in these areas and four were without hearing protection. In the general plant areas of LTS-1, LTS-2 and 35R gas plants, lack of hearing protection use was widespread.

CONCERN: (IH.2-4) The occupational noise and hearing conservation program program does not meet OSHA Standard 29CFR 1910.95, nor does it conform to the UO-NPRC Health and Safety Policy and Procedures Manual. (Also see Concerns IH.2-1, IH.2-2)

PERFORMANCE OBJECTIVE: Official policies, directives and procedures should define the safety, health and quality assurance responsibilities and authorities, provide a statement of management participation and support, require compliance with DOE requirements and provide resources for overall program implementation.

FINDINGS:

- The health and safety program in place at NPR-1 is documented in the UO-NPRC Safety and Health Policy and Procedures Manual (TOC-12). Evaluations of the program's content is presented in Section IH.7 Evaluations of program adherence and enforcement is provided in Sections IH.2, IH.5 and IH.6.
- "Safety and Health Bulletins" are regularly prepared to inform employees of current issues and safety and health activities.
- A "Safety and Health Booklet" is also available which summarizes policy, provides general procedural information and defines roles and responsibilities.
- Responsibilities of the various departments, positions, and employees are clearly defined in the Health and Safety Policy and Procedures Manual.
- Written quality assurance criteria do not exist relative to the personal monitoring program being planned. Examples include: (1) No written calibration procedure exists for sampling pumps (pumps were only recently received). (2) No chain-of-custody or industrial hygiene sample logging system is in place. (3) Procedures for duplicate, field blank, and media blank analyses are not defined.

CONCERN: See IH.2-3.

FINDINGS:

- The industrial hygienist is well-qualified, with B.S. and M.S. degrees and 17 years IH experience.
- Line management is responsible for safety and health policy implementation and enforcement. However, numerous chemical-labelling and hearing-protection-use violations were observed. (See Sections IH.2, IH.5, and IH.6)
- Industrial hygiene field surveillance is limited. The administration of the health and safety program is so very time-consuming that little time is available for field surveillance. See Section IH.2 for further details. This

is evidenced from the results of the facility walkthroughs conducted during one day of this appraisal. Numerous non-compliances were found concerning chemical labelling (see Section IH.6), and noise policy (see Section IH.2) as well as: (1) single-use respirators were being reused (on the two drilling rigs observed), (2) two deficient eye wash/safety shower stations were found.

- o Until the recent past, industrial hygiene programs have lacked basic equipment to fulfill vital responsibilities. Sampling equipment is one example. Five sampling pumps have been acquired in September 1988 and monitoring programs are now being planned. Additional H_2S monitors have been acquired recently (in September 1988) to aid in H_2S surveillance.

CONCERN: See IH.2-1, IH.2-2, IH.2-3, OS.2-2.

PERFORMANCE OBJECTIVE: Management control systems should be in place to assure that safety and health requirements are effectively carried out in the siting, design, procurement, construction, operation, maintenance, modification and decommissioning phases of the life cycle of a project or facility.

FINDINGS:

- See Section OS.4.
- The Safety/Health/Security Department, specifically industrial hygiene, is involved in the planning and conduct of asbestos operations. Any work impacting asbestos must be approved by the Department. Industrial hygiene support and oversight is provided. The industrial hygienist is the Contract Technical Representative for abatement subcontractors.
- The Safety/Health/Security Department also has permit and oversight roles for some other hazardous operations, such as confined space entry, work performed in H_2S areas, and certain types of hot work.

CONCERN: See OS.4-1.

PERFORMANCE OBJECTIVE: The Industrial Hygiene Program should assure prompt identification, evaluation and control of chemical, physical and/or other environmental stresses in the workplace and readily accommodate changing circumstances.

FINDINGS:

- The potential for credible occupational exposures exists for noise, asbestos, vibrations, chemical handling/processing, extreme temperatures, confined spaces, carcinogens, hazardous wastes, and radiation/radiography. Written policies and procedures are defined in the UO-NPRC Safety and Health Policy and Procedures Manual (TOC-12) for the above areas. However, policies and procedures for vibrations, extreme temperatures, carcinogens, and naturally occurring radiation are not included.
- Hazard identification, monitoring, and field inspections are inadequate as specified in Section IH.2 of this report.
- Compliance with Proposition 65 requiring carcinogen identification, notification, and warning has been achieved.
- No documented program, as required by DOE 5480.10 exists for carcinogens despite their presence as exemplified by (1) methylene chloride in degreaser solvents in the vehicle and facilities maintenance areas, (2) asbestos in the 35R gas plant, (3) benzene in oil and gas products.

CONCERN: (IH.5-1) No carcinogen policy exists as required by DOE 5480.10.

FINDINGS:

- Two types of respirators are in use by BPOI employees: self-contained breathing apparatus (SCBA) and half-facepiece air-purifying respirators (negative pressure, cartridge type). SCBA's are used for emergency situations and confined space entry, and other specific applications (e.g. H_2S suspect areas). Air-purifying respirators are used by the Environmental Services Department for hazardous waste assessment and remediation applications.
- SCBA's are for general use while air-purifying respirators are issued personally to individuals.
- The Safety/Health/Security Department has certified approximately 20 individuals for SCBA usage by providing fit testing, training, and medical monitoring. Approximately 20 additional personnel are pending certification. A well-documented file is maintained for SCBA certification. Three

personnel have been similarly certified for air-purifying respirator usage. This certification was arranged through commercially-provided 5-day hazardous waste and asbestos training courses. One additional individual will be certified pending a successful fit test.

- The UO-NPRC Safety and Health Policy and Procedures Manual, Number TOC-12, contains a Respiratory Protection section (12.3, 1230-004) which represents a general policy document. Procedures in use deviate from this document as follows: (1) Reference is made in Part D and in Part G.1.a. to "NPR-1 Written Respiratory Protection Program". This document does not exist. (2) The "Respirator Procurement and Selection" mechanism as stated in Part G.3.c. concerning exposure monitoring is routinely applied for personnel involved in H_2S and oxygen-deficient/explosive operations, but not for BPOI personnel involved in hazardous waste remedial operations.

- Policy and Procedure No. 1230-004, Part A, Part D, and Part G clearly indicate that the this general policy statement is not the written respiratory protection program required by OSHA 29 CFR 1910.134.

- Subcontractors also utilize respiratory protection for such operations as mud-mixing, hazardous waste remediation, and asbestos abatement. No documentation could be found to demonstrate that subcontractors have a written respiratory protection program or that subcontractor personnel have had proper respirator training, fit testing, and medical monitoring. Subcontractor respiratory selection criteria is not reviewed or approved. As an example, respirators stored at a mud-mixing operation were not rated for silica-containing dust and silica was a component of the mud.

CONCERN: (IH.5-2) No written respiratory protection program is in place as required by the OSHA Respiratory Protection Standard (29 CFR 1910.134).

FINDINGS:

- NPR-1 facilities have asbestos-containing materials (ACM) in the 35R gas plant (thermal insulation on towers, piping, and other structures), on piping at various road crossings, and possibly other areas. ACM in the 35R gas plant is damaged and is deteriorating in a number of areas. ACM is marked by orange paint on pipe, tower, and other locations.

- The UO-NPRC Safety and Health Policy and Procedures Manual (Number TOC-12) contains an Asbestos Handling and Abatement section (12.3, 1230-005). This policy complies with OSHA Asbestos Regulations (29CFR 1926.58) except that a "Danger" rather than "Caution" sign is now required. (See OSHA regulations for wording). The policy also complies with USEPA NESHAPS (40 CFR 61, Subpart M).

- Asbestos abatement activities are in the planning phase for the 35R gas plant. For 1989, $100,000 has been allocated for repair of damaged areas and small-scale removal. An operations and maintenance (O & M) program such as outlined in EPA's *Guidance for Controlling Asbestos-Containing Materials in Buildings* (EPA 560/5-85-024, Chapter 3) has not yet been implemented to assure that ACM is properly repaired and maintained.

- A specification for asbestos abatement was reviewed (NPR-1 35R GAP Asbestos Program - Phase II, Removal and Reinsulation Requirements, Specification Number EH-A-1026). Considerations include the following: (1) Monitoring is to be conducted by the abatement contractor rather than an independent firm which raises the issue of conflict of interest. (2) Monitoring requirements are not well defined. (3) The most significant issue is that the final clearance (acceptance for general occupancy) criterion for air quality is 0.07 fibers per cubic centimeter (f/cc) of air which is seven times higher than the 0.01 f/cc criterion recommended by EPA in *Guidance for Controlling ACM in Buildings* (EPA 560/5-85-024). The specification also allows 0.07 f/cc in the BPOI occupied areas, (non-controlled) during abatement.

CONCERN: (IH.5-3) The 0.07 fibers per cubic centimeter (f/cc) reoccupancy criterion in the NPR-1 35R GAP Asbestos Program is not in accord with the lower, commonly accepted 0.01 f/cc level recommended by EPA in their Guidance for Controlling Asbestos-Containing Materials in Buildings (EPA 500/5-85-024).

COMMUNICATION OF HAZARDS TO EMPLOYEES - IH.6

PERFORMANCE OBJECTIVE: Facility personnel should be adequately informed of chemical, physical, and biological stresses they may encounter in their work environment.

FINDINGS:

- The UO-NPRC Safety and Health Policy and Procedures Manual has a written Hazard Communication section (12.3, 1230-001). The procedures in this document are essentially followed and applied with the exception that labelling requirements (Part E.4.b and Part G) are not followed in many cases as elaborated upon below.

- The Hazard Communication section of the Safety and Health Policy and Procedures Manual complies with the OSHA Hazard Communication Standard (29CFR, 1910.1200) except that no statement is made concerning how subcontractors will be informed of hazardous chemicals which they may encounter on the site; e.g., the current practice which imposes upon the subcontractors the need to solicit from NPR-1 the identification and location of hazardous chemicals which may be encountered. See paragraph (e)(1)(iii) of the standard.

- Master files of Material Safety Data Sheets (MSDS) are maintained at multiple locations (Safety/ Health/Security Department, Environmental Services Department, and Juliette) for chemicals used on-site. MSDS's for chemicals used at specific locations (e.g. gas operations, laboratory, vehicle maintenance) are kept at the specific operational headquarters or facility.

- MSDS's are well-maintained and kept up-to-date. MSDS files were reviewed at the Safety/Health/ Security Department, Vehicle Maintenance, Laboratory, 35R Gas Plant, LTS-1 Gas Plant, LTS-2 Gas Plant, and Drilling Operations. In each case MSDS files were available. Among the above areas, 15 MSDS's for specific chemicals/products were requested. Each was promptly found by the responsible person with the following exception. At LTS-1, a drum of 1,1,1, trichloroethane was noted near the cooling tower. An MSDS was available at the Safety/Health/Security Department, but not at LTS-1. The material was reportedly never used at LTS-1 and was delivered by mistake but was never removed. This chemical was supposed to be eliminated from NPR-1 as part of a toxic materials substitution effort. Apparently this drum was an oversight relative to that effort. However, its presence is further indication of field surveillance inadequacies as described in Sections IH.2 and IH.5.

- First-line supervisors are responsible for assuring that their personnel are informed and trained in hazards

associated with their tasks. The Safety/Health/Security Department provides support by presenting training courses and offering guidance concerning safety/health issues. Enforcement and reinforcement of safety and health policies are lacking as described in Sections IH.2 and IH.5.

- o Hazardous chemical labelling is incomplete. This deficiency particularly applies to 55 gallon drums. Drums at multiple facilities were inspected including the 25S LACT, 36S Change Area, 33S Compressor Station, 35R Gas Plant, HPI, LTS-1, and LTS-2. Of approximately 190 drums checked, 130 were either not labelled or had illegible labels, although 100 which were not labelled were in one location (35R gas plant near glycol regenerator). Each location had some drums which were not labelled. As an example, at the 33S Compressor Station, three methanol drums had no identification or hazard warning. The operator had to be consulted to determine the contents.

- o Poly tanks at the well sites were labelled much more effectively. For instance, six of six methanol poly tanks checked at various sites were labelled as to contents and hazard (flammable).

- o Large metal tanks containing product and process materials are generally not labelled.

- o Procedural reminders and postings are inadequate. For instance, noise area postings (e.g. Hearing Protection Required) were not present at 36R compressors, 36R compressor nitrogen oxide area, 33S Compressor Station board, high pressure injector entrance walkway, LTS-1 and LTS-2 plant entries, LTS-1 and LTS-2 refrigeration units, and many other areas. Practices concerning noise/hearing protection areas are not consistent as described in IH.2. As another example, no "Eye Protection Required" signs were present in the laboratory despite use of acids, bases, and other chemicals with severe eye damage potential. Also, asbestos-containing materials in the 35R gas plant is marked with orange paint but not labelled in writing to emphasize the paint's meaning.

- o Three hazardous waste sites were observed for postings and isolation. The 1A-6M arsenic site was posted but not roped. The 373-3G chromium site was roped but the posting had fallen on the ground. The 364 chromium site was posted and roped.

CONCERN: (IH.6-1) Labelling and posting for hazards do not meet the OSHA Hazard Communication Standard (29CFR 1910.1200) and DOE 5480.10. (See Concerns IH.2-1 and IH.2-2.)

FINDINGS:

- Relative to occupational health, the following training programs are conducted: (1) hazard communication, (2) noise/hearing conservation, (3) asbestos, (4) respiratory protection. In addition, special training is provided if deemed necessary to address a specific topic. For instance, when a new, relatively toxic solvent (carbon disulfide) was introduced to the laboratory, a training program was developed and presented to laboratory personnel. Courses generally last one hour as a minimum.

- New employees are provided with an orientation session where safety and health policies and programs are discussed. The topic-specific training courses would be provided at the next annual period.

- Visual aids are generally used in training courses to hold attendee interest and illustrate points.

- Courses are presented to the various departments over a one-month (one course per week) period to attempt to allow all shift personnel to attend. Employees sign an attendance form acknowledging that training was provided, and these forms are filed in the Safety/Health/Security Department. However, no master list of people requiring training is assembled and therefore, no check is conducted to determine if everyone requiring training was indeed trained.

- Outlines of courses are prepared. They are general and do not contain a narrative of the presentation. A change of instructors would require the new instructor to prepare his own course.

- Based on training course outlines, the content of the hazard communication and hearing conservation sessions meet the requirements of OSHA regulations.

CONCERN: See MC.6-1.

PERFORMANCE OBJECTIVE: The Industrial Hygiene Program should minimize the probability of employee illness, impaired health or significant discomfort by identifying, evaluating and controlling those stresses arising in the workplace.

FINDINGS:

- Written industrial hygiene/occupational health policies and procedures are defined in the UO-NPRC Safety and Health Policy and Procedures Manual (TOC-12). The Hazard Communication section (12.3, 1230-001) of the manual was evaluated in IH.6. The Occupational Noise and Hearing Conservation (Section 12.3, 1230.002) policy was discussed in IH.2. The Respiratory Protection section (12.3, 1230.004) of the manual was discussed in IH.5. The Asbestos Handling and Abatement section (12.3, 1230.005) was reviewed in section IH.5.

- The Health and Safety Manual also includes a section (12.3, 1230-003) on Confined Space Entry. Preparation for a confined space entry was observed at the 25S run tank. Procedures in this document were followed (e.g., blind preparation was underway, air monitoring was performed, venting was planned). The Safety/Health/Security Department supported the activities. No OSHA standard currently exists for confined-space entry; however, one is proposed (29 CFR 1910.146). The written policy will require further definition to comply with the proposed standard in its current form. Certified Confined Space Monitors (CCSM) have not yet been trained as stated in the policy document.

- The UO-NPRC Safety and Health Policy and Procedures Manual contains a section on Handling Hazardous Materials (12.3, 1230-006). This document is generally followed except that: (1) contrary to Part 6.7, no "written handling procedures" were present within individual departments; (2) engineering and administrative controls have not been implemented for substitution of carcinogens with non-carcinogens (e.g. use of methylene chloride-containing formulations in degreasers).

- No written or documented policies exist for carcinogens, naturally-occurring radiation, medical monitoring, or heat stress.

- Although there is no basic, overall written medical program in the UO-NPRC Policy and Procedures Manual and there is no medical or nursing presence on the Elk Hills site, certain medical services are provided by a Bakersfield occupational health physician on a fee-for-services basis:

- Audiometric testing is provided to all permanent personnel (Policy and Procedures Manual #1230-002, p. 11).

- Medical screening examination is performed on all employees assigned to an activity that requires the use of a respirator (Policy and Procedures Manual #1230-004, p. 7).

- Employees who handle asbestos receive a pre-placement medical examination prior to initial exposure and annual examinations thereafter.

- All permanent BPOI employees receive a pre-placement examination.

- Certain exempt top-management employees receive periodic medical examination.

- 227 employees have received first-aid training. Supervisors are requested to ensure that trained first-aid individuals are available for each shift of work. (See Section PP.1.)

- Any accident victim requiring more than the readily available, simple first-aid is transported to the Bakersfield physician (30-45 miles distant) for medical attention. (Policy and Procedures Manual #1270-001, p. 4).

- Ambulance service and even helicopter service is provided when it is deemed necessary.

o The BPOI management interviewed were unaware of the existence of DOE 5480.8, Contractor Occupational Medical Program.

o The appraisal team was informed that at the 1985 inception of the NPRC contract, a BPOI transition report recommended an on-site medical presence but that it was not approved.

CONCERN (IH.7-1): The minimum medical program requirements set forth in DOE 5480.8 are not met.

FINDINGS:

o Since 1985, BPOI has had a program to identify and remove asbestos from NPR-1.

o During November and December 1987 there was a sub-contractor program for sampling the insulation covering pressure

vessels and piping at the gas plant preparatory to removal of the asbestos so that the vessels may be tested. (See Section OS.5) Six hundred core samples were collected and analyzed for asbestos.

- o A specification package was drawn up by BPOI to remove asbestos. Chevron raised a number of questions about the specifications, in particular the use of 0.01 f/cc as a maximum background asbestos-in-air level.

- o At a January 27, 1988 conference of CUSA, DOE, and BPOI, BPOI was advised to use 0.07 f/cc as the maximum allowable concentration outside the enclosure. (Conference Note No. CL-00728)

- o The project planning moved forward with over 100 drawings modified to support the project. A total cost in excess of $1 million was estimated for the job (includes engineering and re-scheduling costs) and was added to the AOP Project lists submitted to DOE/CUSA on June 23, 1988.

- o At a meeting on July 5, 1988, between DOE, CUSA and BPOI, it was agreed that the $1,069,000 Asbestos Program funds would be reduced to $100,000 with the $900,000 FY 89 money transferred to a higher priority project titled "Cathodic Protection Anode Bed Replacement". DOE agreed to the deferment providing BPOI immediately address all violations. All parties stated that their long-term objective is still to remove all asbestos.

- o The $100,000 will be used to encapsulate and repair damaged asbestos. The Facilities Engineering staff expressed the opinion that more funds will be needed to repair the damaged asbestos.

CONCERN: (IH.7-2) The reduced priority afforded asbestos abatement prolongs hazards relative to potential asbestos exposure and uncertainties regarding equipment integrity. (Also see Concern MC.1-1.)

FINDINGS:

- o BPOI has a policy, #1230-007 in the Health and Safety Manual, that operations involving radioactive materials "... shall be performed in accordance with applicable local, state, Federal and DOE regulations." For subcontractor radiography operations, the Contract Technical Representative (CTR) is given the responsibility for assessing the safety procedures of the subcontractor. A two-page Radiography Safety-Health checklist is required to be completed at least quarterly and submitted to the Safety/Health/Security Department.

- Radioactive sources (Iridium 192) are used for nondestructive testing and for well logging.

- There is one subcontractor, Ultrasonic Specialists, Inc., that conducts all nondestructive testing at Elk Hills (32 tests during the first 25 days of September 1988, of which 16 were radiographic). The CTR "walks" the job with the bidders before the award, discusses health and safety requirements with the awardee, assures that the testers are qualified and sees that the job is done properly.

- The CTR for well logging subcontractors views himself as a "foreman on location." He schedules the work, notifies the subcontractor, discusses the work with him and then, along with any other workers near the well site, leaves the area instead of staying and monitoring the activities.

- Neither of the CTRs interviewed was aware of his responsibilities under the BPOI Health and Safety Manual (1230-007) and neither had ever seen the Radiography Safety-Health checklist that they were responsible for filling out and submitting to the Safety/ Health/Security Department.

CONCERN: See OS.2-2.

C. FIRE PROTECTION

The present NPR-1 mobile and fixed fire suppression systems do not provide a level of protection consistent with DOE policy requirements relative to life safety, property loss and the unplanned shutdown for unacceptable periods of time for economically important facilities. DOE requirements mandate a level of fire safety comparable to those offered by insurance companies for facilities with fire safe construction, fixed fire detection and suppression systems, as well as a consistent fire prevention/protection program.

DOE orders pertaining to fire prevention and fire protection are specific. The DOE/NPRC policy is not consistent with DOE order 5480.7. A letter from DOE/NPRC through the operating committee to BPOI on September 23, 1985, directed BPOI to ensure that the fire protection program for NPR-1 comply with a DOE/NPRC policy which differed from the requirements of DOE Order 5480.7.

The differences were mainly in the area where fixed fire suppression and detection and/or passive barriers should be provided. The following examples illustrate the result of the inconsistent directions given to BPOI by DOE/NPRC.

1. Foam injection systems for the 18G LACT station have not been installed. The 1987 fire protection review of NPR-1 and BPOI have recommended this protection in accordance with "improved risk" criteria in DOE orders.

2. Local policy designating the Kern County Fire Department (with a response time of 20 to 25 minutes after notification) as the primary responder has resulted in the omission of needed fixed suppression systems. Not only are the systems needed, but they are required by DOE orders and were recommended in the 1983 Fire Protection Survey and, as in the case of the gas plants, recommended in the SARs.

3. High pressure gas compression facilities are operating at many hundreds of pounds pressure, and in some cases, with lubricating oil leakage resulting in oily floors in already congested, poorly ventilated basements. The 1983 Fire Protection Survey recommended fire suppression systems as have the BPOI SARs.

4. Appointing the Kern County Fire Department as the primary responder has resulted in the maintaining of a marginally equipped and trained on-site emergency response team.

Reference is made to the 1983 Fire Protection Survey throughout this report. It is worthy of note that only about 60 percent of the recommendations have been completed. Nine significant recommendations in the report remain to be addressed.

Although BPOI is attempting to make needed improvements, their efforts are diluted because of an inconsistent site fire protection policy.

PERFORMANCE OBJECTIVE: The Fire Protection Program should identify, evaluate, minimize and control those activities that may have adverse impacts on the safety and health of the public and employees or have potential for accidental loss and damage to government property.

FINDINGS: o A documented consistent fire protection program for NPR-1 does not exist.

- BPOI follows practices and guidelines such as those promulgated by the American Petroleum Institute (API), Industrial Risk Insurers (IRI), and the National Fire Protection Association (NFPA).

- The Chevron general fire protection manual has been made available to BPOI for their guidance (DOE/NPRC transmitted the Chevron manual to BPOI on July 22, 1988).

- This diversity of codes, regulations, recommended good practices, and guides can lead to misunderstandings as follows:

  (1) Inspection of the dehydration tanks at the 18G LACT area indicated that, except for several fire hydrants, there was no other fire protection for the tanks.

  (2) An independent review of the maximum possible fire protection compliance review of Elk Hills NPR-1 by James K. Edwards, DOE-SPRO, in April 6-10, 1987, stated that providing over-the-top or subsurface foam injection for 18G, 24Z and 25S dehydration tanks appears justified.

  (3) BPOI also recommended subsurface foam injection for the dehydration tanks at the 18G LACT area. NFPA 11, section 3-2.6.1, on design criteria for foam systems states that subsurface foam injection systems are suitable for protection of liquid hydrocarbons in vertical fixed roof atmospheric storage tanks.

  (4) BPOI Conference Notes taken on April 27, 1988, indicated that DOE/NPRC and Chevron disapproved BPOI's recommendation for foam injection based on the presumptions that the system might corrode from inoperation prior to use and that the foam might not cover all burning surfaces.

They also stated that the reduced risk cannot be economically justified and that no codes or regulations required such a foam system.

(5) BPOI again recommended foam injection protection for the 18G LACT tanks in a letter dated June 9, 1988, to DOE/NPRC.

(6) BPOI Conference Notes taken on June 15, 1988, indicated that Chevron does not provide foam injection in oil field tanks.

(7) DOE/NPRC, in a letter dated July 8, 1988, to BPOI, stated that DOE/NPRC's proposed policy and procedures on fire protection, which has not been approved by DOE headquarters, follows industry standards and does not require a foam injection system on like vessels.

(8) Inspection of the 35R LPG storage area indicated that automatic fire suppression was lacking in the protection of clustered propane, butane and natural gasoline tanks.

(9) An independent fire protection compliance review of Elk Hills NPR-1 by James K. Edwards, DOE-SPRO, in April 6-10, 1987, stated that providing automatic water deluge sprinkler systems appear justified for protecting the LPG storage area.

(10) BPOI also recommended a deluge system for the LPG storage area in their SAR I report.

(11) BPOI Conference Notes taken on February 16, 1988, indicated that Chevron rejected the deluge system on a risk versus cost basis and that BPOI will develop additional justification for a resubmittal of the request for the deluge fire protection system.

CONCERN: (FP.1-1) The failure to establish a fire protection program at NPR-1 consistent with DOE policy (DOE 5480-7) has resulted in the nonuniform and inconsistent applicability of fire protection standards that are mandatory as a matter of DOE policy (DOE 5480.4).

PERFORMANCE OBJECTIVE: Appropriate surveillance of activities should be conducted to maintain control of fire hazards to the public and employees and to minimize accidental losses and damage to government property.

FINDINGS:

- o Fire safety surveillance is a function of the BPOI Safety Department.
- o During the past year, a fire prevention/protection specialist has joined the Safety Department coming to BPOI from a different BPOI Company.
  - This person is a licensed Professional Engineer with many years of fire protection/ prevention experience in the States and overseas, including fire fighting and engineering design.
  - The hiring of this person implemented one of the DOE's 1983 consultant's recommendations.
- o The Safety Office does not have a complete library of DOE orders. The office does, however, have a reasonably complete library of fire-oriented codes, standards, recommended good practices, SAR's, API Good Practices and Improved Risk Guideline documents. (See Concern OS.2-3)
- o Past deficiencies in the fire surveillance activities system in conjunction with the inadequate attention given to fire safety at NPR-1 have resulted in the following:
  - The Garage in Section 36S is not equipped with a suppression or detection systems as required by DOE orders. The building uses flammable/combustible solvents at a dip station with improper lighting. The fuse link to drop the dip tank cover in the event of a fire had been removed. The flammable liquid storage cabinets did not have electrical grounds. The sprinkler system for the former spray paint room, that has been converted to an automobile and truck tire storage room, was found incomplete and disconnected and not in accordance with NFPA standards for rubber tire storage (NFPA 231D). These deficiencies were not noted in the last self-inspection by the facility operator and the safety department.
  - Six (6) Emergency Shut Down systems (ESDs) are located in the area of the LPG truck loading racks. However, emergency excess flow check (shut-off) valves were not provided for the truck loading racks in the LPG Loading/Storage area as required by NFPA Standard No. 58 and improved risk criteria.

- It was noted that screws on junction boxes in electrical "classified" areas such as well pumping stations and in the LPG Storage Tank area were observed to be missing. (See Concerns OS.5-4 and MA.1-4)

- Localized leakage of Therminol was noted at LTS-1 & -2 presenting a fire hazard.

- Therminol fired heaters lack a snuffing medium to extinguish fire box fires.

- Numerous vessels containing flammable and combustible liquids lack fire proofing on skirts and support structures. Where such coatings have been installed the material appears to have spalled and has not been replaced.

- No periodic functional testing of the firing systems on boilers and fired heaters is being done. (See Concern OS.5-3)

- There is no documented routine functional testing of fired heater controls as required by improved risk criteria and/or as specified by Industrial Risk Insurers document entitled "Fired Heaters". (See Concern OS.5-3 and Section FP.6)

- The computer facility in the 11G Administration Building was provided with a halon suppression system. DOE and BPOI personnel were asked whether halon nozzles had been provided under the raised floor and no one could answer the question. The floor plates were lifted and the nozzles were located. The entire facility should be in accordance with DOE EP/108 (formerly WASH 1245-1-1970). This criteria requires, as a minimum, a surrounded one-hour fire barrier complete with fire doors and dampers. None were observed. The halon concentration tests were not performed.

o Existing fire equipment (sprinkler systems, fire extinguishers, halon systems, hydrants, etc.) testing and maintenance are performed by a qualified outside fire protection equipment contractor.

o Water flow tests are conducted by the Kern County Fire Department. It is to be noted that BPOI plans to update water system drawings (as built). Kern County is planning to upgrade their water system by 1990 and needs NPR-1's fire water requirements. (See Section FP.6)

- o Boiler inspections are performed by the State of California personnel. This inspection does not include the firing systems as required by NFPA and improved risk criteria.

- o The availability of an on-site BPOI fire protection professional is enhancing the interface between the Safety Department and the engineering, maintenance, construction, and production organizations.

CONCERN: See FP.1-1

PERFORMANCE OBJECTIVE: Official policies, directives and procedures should define the fire protection responsibilities and authorities, provide a statement of management participation and support, require compliance with DOE requirements and provide resources for overall program implementation.

FINDINGS:

- A fire protection policy document was submitted by the Director of DOE/NPRC to the General Manager of BPOI on September 23, 1985. The document stated incorrectly that by utilizing the Kern County Fire Department (KCFD) as the primary suppression force together with other actions, an improved risk level of fire protection would be achieved. Improved risk has a much broader meaning as defined in DOE 5480.7 and DOE 6430-1A. An important component of improved risk, as defined by DOE 5480.7, calls for automatic fire suppression systems as the primary suppression force for construction and contents where large property losses may occur or where unacceptable operational delays may occur as a consequence of fire. Response capability of fire departments (either on-site or local, e.g., city or county) may be the basic method of redundant fire protection.

- The above DOE/NPRC policy stated that fire suppression shall be provided where the loss could exceed $1 million if determined to be economically justified by fire protection review. DOE 5480.7 states that fire suppression is provided when the maximum possible property loss is in the range of $1 - $25 million to limit the probable loss to $1 million.

- The DOE/NPRC policy states that the maximum foreseeable loss from a single fire, assuming failure of the primary fire protection system, shall not exceed $25 million. DOE 5480.7 states that when the maximum possible property loss is in the range of $25 - $50 million, a redundant protection system is provided that, even in the failure of the primary system, should limit the loss to the lower figure.

- The DOE/NPRC policy states that where large fire losses are possible, redundant capabilities may be required. DOE 5480.7 states that when maximum possible property loss exceeds $50 million, redundant systems are provided and a failure - proof type of fire protection system, such as blank walls or physical separation, is provided to limit the maximum property loss to $75 million.

- A NPR-1 fire policy was developed by BPOI for the NPR-1 and submitted to DOE/NPRC on August 11, 1987 for review and approval. This policy stated incorrectly that DOE 5480.7 fire protection requirements were associated with nuclear installations and that, as a result, the NPR-1 policy would vary from the DOE orders. DOE 5480.7 applies to general facilities with no reference to nuclear installations.

- o DOE/NPRC proposed a fire protection policy in April, 1988 for NPR-1. It did not address the improved risk level of fire protection as defined in DOE order 5480.7. In particular, the degree of fire protection required to limit property damage, as specified in DOE order 5480.7, was not followed.

- o A variance request to deviate from the criteria specified in DOE order 5480.7 has not been submitted to DOE Headquarters.

CONCERN: (FP.3-1) The fire protection policy at NPR-1 does not comply with the level of fire safety specified in DOE 5480.7.

PERFORMANCE OBJECTIVE: Management control systems should be in place to assure that fire protection requirements are effectively carried out in the citing, design, procurement, construction, operation, maintenance, modification and decommissioning phases of the life cycle of a project or facility.

FINDINGS:

- A fire permit control system is delineated in the Policy and Procedure Manual (#1240-9003).
- The Construction Department is responsible for building facilities and equipment in strict accordance with specifications and drawings received from Facilities, Drilling and Production Engineering as well as outside AE's. This organization handled 149 projects during FY 87. The Construction manager stated that "field changes are approved by the originator of the document and the Construction Department assumes that all safety issues including fire safety are resolved prior to receipt of the engineered package and/or field change order approval."
- Refer to Section OS.4.

CONCERN (FP.4-1): The Construction Department does not require review of field changes for all safety issues, including fire safety, prior to receipt of the field change order approval. The result is that construction can proceed without adequate fire protection consideration.

PERFORMANCE OBJECTIVE: The facility should provide adequate egress facilities for all its occupants under all normal and emergency conditions.

FINDINGS:

- With the exception of the basement areas of the indoor compressor facilities at the LTS-1 Gas Plant, LTS-2 Gas Plant, High Pressure Injection (HPI) Compression Station, and 33S and 35R Gas Compressor Plants, all other facilities at the NPR-1 comply with the intent of NFPA 101 Life Safety Code.

- The exits in LTS-1, LTS-2, HPI and 33S are within NFPA 101 prescribed travel distances. However, the underfloor areas have restricted headroom clearances, poor access/egress and poor lighting. These conditions exist because of underfloor equipment congestion.

- Ultraviolet (UV) fire detectors have been installed in the underfloor areas of the LTS-1, LTS-2, 33S and the HPI Compression Stations as recommended by the 1983 Fire Protection Survey.

- In 1983, automatic deluge type water spray systems were recommended by the Fire Protection Survey of NPR-1 for 33S, 35R, LTS-1, LTS-2 and the HPI Compression Station. These systems have not been installed.

- Automatic deluge type water spray systems (with foam injection capability) operated by the existing UV detection systems have been recommended in the BPO1 Safety Analysis Report of November, 1986 for LTS-1, and LTS-2, and the HPI Gas Compression Station. Fixed fire fighting capabilities were recommended for the 35R Gas Plant (April 1986).

- There was an explosion in 1981 in the LTS-1 gas plant basement which scattered steel plating over a wide area of the operating floor. Recommendations to mitigate the potential for and the consequences of an explosion in the basements of LTS-1 and -2 and the HPI Compression facilities have not been completed. In some instances, improvements have not been started with some interim measures being rejected.

- An informal tracking report of SAR I & II recommendations was reviewed. This informal report under development by the BPO1 Safety Department did not contain recommendations from other reports or Safety Department inspections.

- A foreman in the LP Gas Storage Facility, when asked why missing junction box screws on classified electrical equipment has not been immediately replaced (and there were too many to be a random occurrence), replied by saying that it had been reported to maintenance and they would get around to it within the next 4 or 5 months.

- The fire suppression equipment and systems recommended by the Fire Protection Survey in 1983 and in the SAR I and II reports have not been completed. (See Section A - Public Protection Program.

CONCERN: (FP.5-1) A formal tracking system for monitoring the status of fire safety recommendations in SAR's and other inspection reports does not exist.

PERFORMANCE OBJECTIVE: The facility should qualify as an "Improved Risk" or "Highly Protected Risk" as commonly defined by the property insurance associations specializing in such coverage.

FINDINGS:

- Three safety analysis reports have been prepared and fire safety was addressed in a very thorough manner except for potential credible accidents. (See Concern PP.1-1)
- The "Maximum Possible Fire Loss Analysis and Facility Fire Protection Policy Compliance Review" document dated January, 1987 was used to estimate capital costs and daily dollar production losses discussed in Section FP.8.
- There have been no exemption requests submitted to DOE Headquarters asking for a variance from the basic objectives of the DOE Fire Protection orders as prescribed in the DOE Order 5480.4, Environmental Protection, Safety, and Health Protection Standards.
- There have been no exemption requests submitted to DOE Headquarters requesting a variance from the recommendations delineated in SAR I, II or III.
- The facility is included in the independent fire protection survey program provided by the EH. No corrective action plan to accomplish the recommendations in the 1983 Fire Protection Survey was located and there have been no variance requests. Only about 60 percent of the recommendations in the survey review have been completed. Nine significant recommendations in the survey report still have to be addressed as follows:

RECOMMENDATION	FIRE PROTECTION CONCERN
4.3.4.1	Provide Automatic Deluge for 33S Gas Compressor Station
4.3.5.1	Provide Automatic Deluge for 3G Gas Plant
4.3.6.1	Provide Automatic Deluge for 35R Gas Processing Plant
4.3.7.1	Provide Automatic Deluge for LTS-1, LTS-2 Gas Processing Plants
4.3.9.1	Provide Automatic Deluge for HPI Plant

4.3.9.5	Improve Electrical Maintenance in Hazardous Areas
4.3.16.1	Provide Automatic Fire Suppression for 18G LACT
4.4.1	Establish Fire Station or Brigade
4.4.3	Provide Training for Fire Brigade

- An inspection/testing program for all items of existing fire protection equipment is being performed by an outside contractor. The specification for judging the conduct of the work is well written and is reviewed periodically by the facility fire safety specialist. This program is covered in the Policy and Procedures Manual (#1240-002).

- A separate fire-related self-appraisal program does not exist for the facility. It is part of a general safety inspection program.

- There is a corrosion inspection program to maintain electric cathodic protection for process piping, provide periodic ultrasonic thickness testing, and conduct inspection corrosion coupon testing.

- There is no hydrostatic testing for process piping and no general inspection program for process piping at times other than during installation and repair.

- A quality control program for hydrostatic testing and inspection of process piping is lacking to help prevent accidental release of hazardous materials and possibly exposing flammable and combustible fluids to ignition sources.

- A training program exists for fire extinguisher training. Employees were trained on an annual basis but will in the future be trained on a triannual basis.

- A training program exists for facility employees assigned fire response responsibility. A review of the training records for 1988 reveals that only 20 of the 55 person team attended the spring session and only 29 attended the August session. There is no formal procedure regarding attendance or training for personnel assigned to the emergency response team (ERT). (See Concern PP.3-1)

- The on-site fire and emergency response team does not have the proper level of training as specified by OSHA

requirements for emergency response and only two of the six fire response team members meet OSHA rules for fire response training. (See Section MC.6)

- There are only five fire prevention and protection procedures contained in the Safety and Health Manual.

  1240-001 - Emergency Reporting & Handling of Fires
  1240-002 - Inspection & Testing of NPR-1 Fire Protection Equipment
  1240-003 - Fire Permit Requirements
  1240-004 - Hot Work Permits
  1240-005 - Use of Motorized Vehicles in Hazardous Areas

- Fire protection equipment is provided at well sites in accordance with BPOI "Manual of Uniform Rules, Regulations and Safety Requirements for Subcontractors Performing Work at NPR-1."

- All subcontractors are required to utilize the BPOI Safety & Health Procedures Manual.

- A number of fire safety concerns are addressed in the BPOI site-specific individual operating instructions.

- Fire loss records are maintained, analyzed and reported in accordance with DOE 5484.1.

- An effective assurance program exists for maintaining the integrity of existing fire protection controls.

- Small (less than 42 gallons) quantities of flammable liquids are stored in approved storage cabinets though it is evident that not all cabinets are being properly grounded.

- Portable fire extinguishers are in use throughout NPR-1. Extinguisher location markings are not in conformance with OSHA criteria and/or NFPA No. 10.

- Boiler and fired heater controls do not have all of the controls stipulated in NFPA documents. Items such as fail-safe over-temperature devices, high and low gas pressure switches were found missing on most of the 10 to 12 installations visited during this appraisal. SAR's I, II & III have indicated a need for additional controls.

- There is no standardized use of visual alarm systems. A flashing red light could mean that there is unspecified trouble, a high tank setting, or that entry is allowed. A blue light could mean a gas leak or that power is on. (See Concern PP.4-1)

- o Fire detection devices and alarms are in existence at hazardous locations such as gas plants, though suppression equipment needed is often lacking.

- o Fire pumps are routinely checked by the BPOI Fire Safety organization (a part of the Safety Department). Hydrants are tested annually by a licensed fire protection subcontractor along with monitors, hose reels and fire pumps. Kern County periodically (unscheduled) runs flow tests on selected hydrants.

- o Recommendation 4.2.16m in the 1983 Fire Protection Survey of NPR-1 called for the establishment of an effective water reserve for fire protection, which in turn necessitates a study of the NPR-1 water system including water sources and demands. There is additional urgency for such a study because Kern County is planning to drill more wells and provide a larger water line adjacent to NPR-1 in about two years. The county needs an estimate of NPR-1's water demand to meet the latter's needs.

- o Some special hazards are protected by extinguishing systems (i.e. Computer Room in the 11G Administration Building). A number of special systems were recommended by the independent contractor and in the various SAR's. A great deal of work remains to be done.

CONCERN: See FP.3-1 and MC.6-1.

FINDINGS: Substations (35R & 18G)

- o Electrical power from Pacific Gas & Electric Company is received at the 35R Substation. (See Dwg. F-001-G100)

- o This electrical energy is distributed from the 35R Substation to substations in Sections 3G, 8R, 18G, and 33S (see Dwg. F-001-G100).

- o The substation serving 18G LACT Process is a dead end system and a catastrophic loss of this substation would result in a shutdown of this economically important process.

- o Destruction of the "Ring Bus" at 35R Substation could cause a complete shutdown of NPR-1. A MORT-analysis showing the 35R Substation as being the single point failure for NPR-1 was observed during this appraisal.

- o There is no "bypass" capability for the Ring Bus at Substation 35R and it is understood that the a 115 KV bypass system around the bus has been proposed in the past. The drawing showing this proposal was observed during this appraisal.

- o The 35R Substation contains three transformers each containing 2700 gallons of combustible transformer oil and three oil circuit breakers each containing 600 gallons of a similar type oil.

- o Recommendations covering the need for fire suppression capability at each of these facilities have been made for NPR-1 since February 1983.

CONCERN: (FP.6-1) The lack of automatic suppression, automatic fire detection, and/or passive barriers in the 35R switchyard has the potential for a total loss of power to NPR-1.

FINDINGS:

- o There is no reliable on-site fire and emergency response team available after-hours including weekends.

- o Pre-fire plans which have been approved by BPOI are on file with the Kern County Fire Department. Since there is no formal fire fighting organization on-site, pre-fire plan drills are not conducted. Some site specific facilities have incorporated informal pre-fire plans into operation procedures. Basically, the plan calls for leaving the building or area and leave the fire fighting to KCFD. As a result, adequate life and property protection from even minimally trained personnel cannot be ensured.

- o The Kern County Fire Department (KCFD) provides fire and emergency response. However, KCFD response could be as long as 25 minutes.

CONCERN: (FP.6-2) The Kern County Fire Department's response time of 20 to 25 minutes after notification could result in an unacceptable loss and/or down time.

PERFORMANCE OBJECTIVE: The facility should not present an unacceptable risk to the public or the environment as the result of an on site fire permitting the release of hazardous materials beyond the site boundaries.

FINDINGS:

- o An emergency response vehicle is now on site though it is usually used for fighting brush fires. Personnel to operate the vehicle are not always on site.

- o There is no 24-hour on-site organized fire response organization brigade nor emergency response HAZMAT team properly staffed and trained to limit fire release of hazardous threats to surface and ground water quality as prescribed in OSHA 1910.120 as related to emergency response at sites other than hazardous waste clean-up sites.

CONCERN: See PP.1-2.

FINDINGS:

- o General Recommendations for equipment spacing published by the Industrial Risk Insurers (an improved risk organization) recommended that control houses be spaced 100-200 feet from process equipment, cooling towers, product storage tanks, and gas compressor houses.

  - The control room buildings for LTS-1 & -2, 35R and 3R Gas Plants are located less than 100 feet from process and storage areas.

  - The LTS-1 & -2 Control Houses contain plate glass windows facing the process areas.

  - The LTS-1 & -2 Control Houses have ventilation air intakes that have the potential for causing evacuation of the building in the event of a rupture of process lines or vessels located adjacent to the control house. This could result in the failure of personnel to negotiate a safe shutdown.

  - The control room is not an electrically "classified" area (no explosion-proof electrical equipment).

  - Recommendations are made by BPOI in SAR I, II, & III to correct the above noted deficiencies.

  - There are safe shutdown switches located at various locations throughout the compressor buildings, process piping areas, tank storage areas, fired heater areas, etc., at LTS-1, LTS-2, HPI and 35R Plants.

- o There are no hazard labels on tanks and other equipment as required by NFPA, OSHA, EPA and DOE orders.

  - The lack of NFPA hazard labels is a violation of DOE orders, NFPA 704 standards and a violation of OSHA/EPA/RCRA regulations. (See Concern OS.3-2)

CONCERNS:

(FP.7-1) Spacing recommendations of improved risk criteria are not always followed for existing facilities.

(FP.7-2) Recommendations to harden the Control Houses are not contained in SAR II.

D. TRANSPORTATION AND SHIPPING

The cathodic protection program at NPR-1 is satisfactory. The procedures, training, and facilities for the program are based on internationally accepted standards and guidelines. The project management control system used for transportation-related projects generally follows the procedures used by highly competent project managers. The transportation of hazardous wastes from spill location to approved disposal site is adequate.

There is no BPOI statement of transportation and shipping policy for NPR-1. Although some elements of transportation and shipping are covered in a few documents, there is no frame of reference for planning and action. Additionally, responsibilities are unclear, as well as the division of labor and the assignment of authority.

It is clear that BPOI must comply with DOE Order 5480.3 covering safety requirements for transportation and shipping. It is equally clear that NPR-1 operations are not being conducted in compliance with it. For example, shipments of natural gas samples are not in compliance with DOE Order 5480.3.

BPOI properly undertook an investigation into the status of the wall thickness of existing pressure vessels and pipelines under pressure. It remedied those items found to be critical by removing them from service or by reducing pressure. It did not complete the investigation, nor reduce pressures on the untested vessels/pipelines as a compensatory safety measure until the investigation could be completed.

BPOI does not have a specific quality assurance program for transportation safety, and the quality assurance coverage of transportation-related activities is minimal. When the lack of a quality assurance program for transportation and shipping is coupled with the incomplete coverage of activities, the result is unsatisfactory.

Day-to-day operations by BPOI at NPR-1 are covered by operating instructions developed by each department, but there are none for the transportation of hazardous materials excluding hazardous wastes. The transportation of hazardous wastes is covered in a policy and procedures document to which operating instructions are subservient. Employees are left without hazardous materials transportation and shipping guidance, and satisfactory performance is not achieved.

There is no specific training for hazardous material transportation and shipping. This lack of training violates 49 CFR and California State transportation regulations.

PERFORMANCE OBJECTIVE: The Packaging and Transportation Program should identify, evaluate, minimize and control those activities that may have adverse impacts on the safety and health of the public and employees or have potential for accidental loss and damage to government property.

FINDINGS:

- The truck loading rack for natural gas liquids (NGL) drawings are "up-to-date" and the physical facilities are accurately depicted on the drawings.
- The titles of the procedures used in the NGL truck loading rack area do not fit the titles used for the personnel. The "Gas Operators Progression Book, effective 10-1-82", is still in use but the titles are not correct. The subject material is correct, however.
- Monitoring of sacrificial and impressed-current cathodic protection systems is accomplished on an annual basis. The 560 active rectifiers on NPR-1 are inspected monthly. Reverse current switches, diodes and interference bonds are inspected monthly.
- References for cathodic protection are the National Association of Corrosion Engineers criterion RP-01-69, which covers cathodic protection and the determination of measurements, and the "Control of Pipeline Corrosion," by A.W. Peabody.
- The Safety/Health/Security Department provides other departments advice, memos, job safety analyses, and Field Safety Directives covering work operations in transportation and shipping. An example of this is the installation and maintenance of portable eye wash stations mounted on trucks.
- The procedure for transportation safety recommendations begins with the first line supervisors. The next level consists of work orders for the service of subcontractors. An example of this is the upkeep and maintenance of the truck wash-out facility. The third level is the development and implementation of projects for transportation safety. One example is the redesign of the intersection of Skyline and Elk Hills Roads to improve the left turn provisions and the merging provisions. Another example is the annual project for relining of the major roads and upgrading of reflectors to assist drivers during periods of reduced visibility because of the seasonal heavy fog conditions.
- The unknown contaminants from spills and hazardous waste

samples are sent off-site to California Certified Laboratories for identification required by the disposal site. The results of the various types of analyses are returned to the Environmental Department within a range of 24 hours to 2 months, depending on the type of analysis performed. This time frame poses no problem for hazardous waste disposal, but in some cases cause operational time problems. Examples are the analysis of tank bottoms, and the identification of other samples.

- o Monitoring for potential contaminants from routine operations is accomplished by the subcontractor for hazardous waste shipments off-site.

- o Contracts require subcontractors to police work areas before turning them over to BPOI, and BPOI inspects the areas before accepting the work. Contracts also require that the subcontractors dispose of their own hazardous waste.

CONCERN: None.

PERFORMANCE OBJECTIVE: Appropriate surveillance of activities should be conducted to maintain control of potential hazards to the public and employees.

FINDINGS:

- Two Authorizations for Expenditure to perform ultrasonic testing to determine wall thickness at NPR-1 were approved in November, 1984. The first subcontract was awarded in March, 1986. A total of 1624 vessels and 3006 pipelines were included. (See Sections OS.5 and IH.7)
- As of June 15, 1988, about 80 vessels/pipelines had not been ultrasonically tested because of asbestos-containing insulation or ice cover.
- Project Number 69001, a plan to test the untested vessels/pipelines, was approved by DOE/CUSA on August 2, 1988, with work to be accomplished in FY 1989.
- Wall thickness is directly related to safe operating pressure. BPOI has reduced operating pressures on some tested vessels based on the results of ultrasonic testing.

CONCERN: See OS.5-1.

FINDINGS:

- The Safety/Health/Security Department plans and conducts 4 scheduled and 10 unscheduled field inspections per month. Transportation and shipping items may be a part of these inspections. Two times per year inspections are conducted of vacuum trucks. These inspections include driver training records, verification of driver licenses, and vehicle safety. (See Section TS.7.b)
- All of the vacuum trucks at NPR-1 belong to subcontractors. The requirement to comply with all motor carrier safety specifications is included in subcontractors' contracts. Vacuum trucks comprise the largest number of trucks on NPR-1.
- The California Highway Patrol annually visits NPR-1 and conducts an in-depth motor carrier safety inspection of all vacuum trucks with the cooperation of the Safety/Health/Security Department. Violations are noted on CHP Form 343A OPI 061, "Vehicle/Equipment Inspection Report, Motor Carrier Safety Operations." The Safety/Health/Security Department receives a copy of these reports and tracks corrections of the violations.
- All subcontractor cranes greater than 3 tons are required to be California state certified.

- The Safety/Health/Security Department conducts accident investigations of all types in attempts to identify probable causes and prevent reoccurrences. Consultants are used as necessary.

- There is a Policy Procedure Manual which requires that all work permits be reviewed by the Safety/Health/Security Department. Work orders are reviewed as needed.

- Construction site transportation safety inspections are considered more important than other transportation safety investigations because of the use of earth moving equipment and other equipment which have a high potential for transportation accidents.

- The only personnel exposure surveillance data base which exists in the Safety/Health/Security Department is for three construction employees who wear radiation film badges. There is no data base for chemical, biological or other physical stresses. (See Sections IH.1 and IH.2)

CONCERN: See IH.2-3.

POLICIES, DIRECTIVES AND PROCEDURES - ST.3

PERFORMANCE OBJECTIVE: Official policies, directives and procedures should define the safety, health and quality assurance responsibilities and authorities, provide a statement of management participation and support, require compliance with DOE requirements and provide resources for overall program implementation.

FINDINGS:

- o There is no written BPOI transportation and shipping safety policy, but each subcontractor must have such a policy to qualify for contracts.

- o There are BPOI Operation Instructions for the NGL loading racks (LTS-1,LTS-2 & 35R). For the loaders, the only transportation item that is reflected in the Operation Instructions for the racks only instructs the loader to require "That the tanker has the proper product identifier on the outside of the tanker. Propane/Butane - 1075, Natural Gasoline -1203." The Operation Instructions do not instruct the loader to check for compliance with (1) other requirements of 49 CFR, (2) California state transportation regulations and (3) DOE Order 5480.3. Examples of other requirements are vehicle safety, cargo tank specification and tank test date.

- o There are no specific procedures for hazardous material spill response. The Safety/Health/Security Manager and the Environmental Manager jointly determine the procedures to be used for each spill. Although there is a "Spill Prevention Control and Countermeasure Plan" required by 40 CFR 112, this broad-based plan has no specific (how to do) procedure. It establishes the organizational framework for spill response including notifications to be made. (See Section PP.2)

- o The responsibility for transportation safety is not assigned. The Safety/Health/Security Department staff is not qualified in motor carrier safety or hazardous materials transportation safety. The staff has insufficient time to adequately audit all aspects of all subcontractors for transportation safety items. The scope of their activities is satisfactory but not the depth.

CONCERN (ST.3-1): No policy and procedures are established for transportation and shipping functions.

FINDINGS:

- o Each department has a program to track identified deficiencies within that department.

- The Quality Assurance Department does not evaluate the solution to a deficiency. Rather, such evaluation is done by the involved department.

- Each department is required by PPM 22150-002 to have a non-conformance procedure and to correct non-conformances.

- Each department is required to trend non-conformance data and to take appropriate action when trends become adverse to safety. The Construction and Facilities Maintenance Departments have non-conformance procedures; neither have trending analysis procedures.

- Personal protection equipment for hazardous waste and radiography operations is made available by the individual departments. (See Section IH.2)

- No internal program exists to evaluate the efficacy of safety program activities associated with transportation. The QA Department audits the departments for the existence of safety programs, but not the efficiency nor the effectiveness.

- The QA Department, in order to meet award fee requirements, performs at least 4 departmental audits and 4 subcontractor audits per month. There are 20 departments and about the same number of subcontractors on the site per month. (See Section TS.7)

- Many of the QA Department audits are limited in scope due to limited manpower and the complexity of a major audit. A major audit would include the 19 elements of the QA program. The QA Department has a long-term (four months in advance) and a short-term schedule for audits. None of the QA audits have been conducted solely for transportation and shipping safety activities.

CONCERN: See IH.2-2 and TS.7-1.

FINDINGS:

- In the truck loading rack area, the loaders have on-the-job training that includes self study, as well as a job performance evaluation check list (sign-off by supervisor). The foreman trains a loader and an informal open-book test is given. The weighmasters only have on-the-job training. This program was documented in the "Gas Operators Progression Book, effective 10-1-82," but has not been updated by BPOI.

- Environmental personnel handling hazardous waste have received several off-site training courses for handling

hazardous waste. No specific transportation courses have been completed by the environmental personnel. However, one staff member has received training in DOT/EPA hazardous materials and hazardous waste regulations.

- o The corrosion protection training program is coordinated with Human Resources but not with the training officer. The reason given for this approach was the highly technical nature of the training.

- o Evidence was found to indicate that only one BPOI staff member has received any hazardous materials transportation training as required by 49 CFR 173.1(b). (See Section PP.3)

- o There is no integration of on-the-job (OJT) training, formal classroom training and certifying of "fully qualified" for truck loaders (NGL), weighmasters, and hazardous waste and laboratory technicians for transportation and shipping safety requirements. Truck loaders and weighmasters training is only OJT, there is no formal classroom and no official certifying examination. There is an "open book" type of test where all the answers are given in advance and can be copied.

CONCERN: See MC.6-1.

FINDINGS:

- o Each department is required by PPM Series 22 to have quality control procedures. The Quality Assurance Department uses a compliance audit system to assure that the departments are following their existing procedures.

- o BPOI has a transportation procedure entitled "Specification for Disposal of Drums, Capacitors, Transformers, and Other Hazardous Wastes on NPR-1" dated April 11, 1988. This procedure, for BPOI subcontractors, requires that all waste materials be prepared for transportation per U.S. DOT regulations, and that all transportation be performed in compliance with U.S. DOT and California Department of Occupational Health and Safety regulations.

- o Corrosion protection personnel have been trained using the "Guide to Qualification of Cathodic Protection Test Personnel, National Association of Corrosion Engineers, 1987." Eight BPOI corrosion protection personnel have met the requirements of Bechtel as a Cathodic Protection Tester.

- o The Safety/Health/Security Department participates and communicates with top management at all levels on various subjects such as pre-bid, design and construction activities. This involvement includes various inspections of vehicles and transportation equipment as well as Contractor Technical Representative transportation safety oversight.

- The special equipment used in corrosion control is on a scheduled calibration program. Each technician is assigned his own equipment and schedule of calibration. There is a computerized record kept of the equipment status. (See Section TS.6)

CONCERN: None.

MANAGEMENT CONTROL SYSTEMS - ST.4

PERFORMANCE OBJECTIVE: Management control systems should be in place to assure that safety and health requirements are effectively carried out in the sitting, design, procurement, construction, operation, maintenance, modification and decommissioning phases of the life cycle of a project or facility.

FINDINGS:

- Project management control systems are defined in the Authorization for Expenditure manual. Work breakdown structures are related to objectives; budgets and schedules are based on work to be accomplished. Coordination is achieved by required departments. Implementation is monitored, and changes made as necessary considering internal and external requirements. Closeout is related to original project goals. (See Sections TS.1 and OS.4)

- There is a pre-award contract safety review for use and transportation of hazardous materials on site. Safety, environmental and quality assurance management participate in this review.

- The QA Department reviews subcontractor contracts for quality program requirements. Examples of these reviews are record keeping for hazardous waste contracts, soil testing for hazardous waste, and calibration of equipment.

CONCERN: None.

PERFORMANCE OBJECTIVE: Site-wide operations involving packaging, materials handling and movement, and transportation (PHMT) should be conducted in a safe, consistent and accountable manner, following approved procedures, in conformance with applicable standards and accepted practices.

FINDINGS:

- o BPOI operating procedures in PPM 1860-005 address the packaging and transportation of hazardous wastes.
- o There are no BPOI Gas Operations Laboratory operating instructions for the packaging and transportation of natural gas samples in one-liter cylinders off-site.
- o There are no operating instructions for the on-site transportation of hazardous materials from the warehouse.

CONCERN (ST.5-1): Departmental operating instructions exist only for the transportation of hazardous wastes, not for other hazardous materials.

FINDINGS:

- o PPM 1860-005. "Disposal of Hazardous Waste" contains errors in "E. REFERENCES Item 1." with respect to the Code of Federal Regulations. Missing in Item 6.3. is 49 CFR "Parts 171, 172, and 177." In "Item G.6., DOT Hazardous Codes" the correct terminology is "proper shipping name, identification number, and hazard class" as described in 49 CFR "171", not "172."
- o There is an informal policy to stop the use of 55 gallon drums for the transportation of hazardous materials. Instead, bulk transportation is being used.
- o No reusable packaging is used on site.
- o A review of the hazardous waste shipments was made by the appraisal team. The "Manifest Record 1988" printout was reviewed and compared to the actual "Uniform Hazardous Waste Manifest." Three of six entries on the manifest record for the 1/26/88 printout were incorrectly entered into the system. The Uniform Hazardous Waste Manifest was correct when offered for transportation. (See Section IH.2-2)
- o Site security is provided by a subcontractor, Trans West. The BPOI "Security Handbook" has procedures for the handling, approaching, and communicating of hazardous materials incidents. The security guards do not log all hazardous materials coming on site nor do they check for the DOT required shipping papers.
- o Due to the nature of operations, there is minimal hand-carrying of hazardous materials on site.

- For service contractors, the Safety/Health/ Security Department and QA department assure certification and experience of personnel during the pre-contract award process.

- All fork lift operators working in the warehouse are certified and recertified.

- There is a Long Range Plan for compliance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

- There are no shipments of radioactive materials packages by BPOI personnel.

- The warehouse has operating instructions to receive all materials, including hazardous materials.

- The warehouse has operating instructions for checking incoming packages of hazardous materials for breakage and leakage. No vehicles are checked before off-site release.

- The QA Department audits the specific procedures of the Safety/Health/Security Department for loading product trucks and vacuum trucks.

- BPOI employees do not require training per 49 CFR 391 because no placarded quantities of hazardous materials are transported by such employees.

CONCERN: None.

PERFORMANCE OBJECTIVE: Performance of the packaging and transportation functions should assure conformance with existing standards and accepted practices as given in DOE 5480.3, and its references.

FINDINGS:

- o There is no transportation section in the Policy and Procedures Manual, however, several specific sections contain minor items of transportation requirements.
- o There is no individual acting as transportation manager for NPR-1.
- o Each department is responsible for its own transportation and shipping functions.
- o There is no coordination of transportation-related activities, including BPOI and subcontractor transportation.

CONCERN: (ST.6-1) The responsibility and authority for transportation and shipping safety are not clearly established.

FINDINGS:

- o The Safety/Health/Security Department has no specific operating instructions for transportation and shipping functions. Individual departments have such operating instructions.
- o The "Radiography Safety/Health Checklist" in PPM 1230-007 does not require one to identify if the radiographer had proper DOT shipping papers and if the radiography device was packaged properly per 49 CFR for transportation on site.
- o The laboratory shipments of natural gas samples in one-liter cylinders off-site are not properly marked or labeled for off-site shipment as required by DOE Order 5480.3. There are no shipping papers used for off-site shipment in privately owned vehicles. Many DOT 3A, 3AA and 3B cylinders were manufactured over ten years ago. For example, numerous DOT 3B cylinders were embossed with dates of 8-76 and 10-75. The DOT requires in 49 CFR 173.34(e) that DOT 3A, 3AA and 3B cylinders be retested at least every five years, and this test date must be embossed on each retested cylinder. Therefore, all cylinders observed were unauthorized for filling and shipping.
- o A subcontractor's truck was observed carrying a package which contained a full non-flammable gas cylinder. This package was not blocked or braced on the back of a service truck and could have easily slid off of the truck. This is a violation of 49 CFR 177.834(a).

- o Operating motor vehicle equipment responsibilities are covered in the BPOI "Safety and Health Booklet, Issue 5, September 1, 1986." The references to the transportation of hazardous materials are inadequate since they only address flammable liquids and explosives.

- o Shipping papers used at the NGL truck scales area for the transportation of propane, butane and gasoline do not contain the shipper's certification required by 49 CFR 172.204(a). The two forms used by BPOI are Form:7-029 (2-11/86) and MOT-4-LPG (05-2-87).

- o While observing a field radiography operation, the Appraisal Team discovered that the subcontractor failed to mark the proper shipping name and identification number and apply radioactive labels on an overpack carrying a package of Radioactive Material, Special Form, N.O.S. These are each violations of 49 CFR 173.25(a)(2). (See Concern OS.2-2)

- o The only markings and labels that were observed by the Appraisal Team on packages of hazardous materials were the markings and labels of the original shipper. BPOI does not assure that markings, labeling and authorized specification packages of hazardous materials transported on site by BPOI or subcontractors are in compliance with Federal and state transportation regulations and DOE Order 5480.3 when carried on site. These comments do not apply to hazardous wastes.

- o BPOI management indicates that subcontractors are not considered to be transporting hazardous materials in an area when they are performing under a service contract. However, these subcontractors are transporting hazardous materials and must comply with DOE Order 5480.3. (See Concern MC.4-2)

- o DOE Order DOE 5480.3 -- Safety Requirements for the Packaging and Transportation of Hazardous Materials, Hazardous Substances, and Hazardous Wastes -- dated 7-9-85, references Title 49 CFR 109-199; it also states in "Section 7. Requirements. a. Federal Regulations. When offered to the carrier, each shipment of hazardous materials, hazardous substances, or hazardous wastes shall be in compliance with this Order and the applicable safety regulations of the Department of Transportation, . . ."

CONCERN: (ST.6-2) BPOI is not in compliance with DOE Order 5480.3, with the result that numerous 49 CFR and California state transportation requirements are not being met.

FINDINGS:

- The Safety/Health/Security Department subscribes to the Bureau of National Affairs, and their staff reviews it especially for hazardous materials regulatory changes. The changes are communicated to the subcontractors through the contracting process.
- There have been no transportation and shipping safety appraisals at NPR-1 by DOE/NPRC.
- Bid specifications include the requirement that a subcontractor for hazardous wastes transportation have an EPA identification number.
- The quality of packaging is reviewed by the construction, corrosion, production operations, safety and environmental departments during pre-bid efforts for subcontractors. Installations are inspected per contract specifications by the production and safety departments, and operational status by the production department.
- The OA Department performed 2 audits of the Safety/Health/Security Department finding that their procedures interfaced with local fire and police departments. The Safety/Health/Security Department conducts a monthly coordination meeting for emergency preparedness plans. The California Highway Patrol, local sheriff's office and BPOI Security Department investigate all vehicular accidents with injuries on NPR-1.

CONCERN: None.

E. OPERATIONS

Observations revealed the work force is, for the most part, knowledgeable about the operations for which they are accountable. They were observed performing many duties and, in general, their performance was good. However, in some instances they violated safe practices, or did not properly complete facility status controls.

Personnel at all levels were not noting equipment conditions and writing sufficient work orders to properly maintain process equipment. Furthermore, supervisors are not closely monitoring operations, nor taking corrective actions to promote safety, dispel complacency and ensure adherence to policies and procedures.

Sufficient examples of inadequate performance throughout this and other sections of this report support the need for additional training to correct identified deficiencies.

PERFORMANCE OBJECTIVE: Operational activities should be conducted in a manner that achieves safe and reliable facility operation.

FINDINGS:

- Observations of conditions were made at 42 of the 60 large gas compressors at the facility. In addition, observations were made at smaller compressors, such as air compressors and vapor recovery compressors. Generally speaking, they were operating without much vibration, had an acceptable amount of oil on the compressor/engine foundation, had sturdy walkways/handrails, and had few deficiencies. Especially clean was the 33S compressor station.

- Compressor installations at the 30R station were in poor repair as was adjacent piping. Among the problems at 30R station were:

  (a) Excessive vibration of small diameter piping at an Emergency Shut Down (ESD) station whose failure would cause eight (8) compressors to stop.

  (b) Water squirting on a line near the engine from a hole in a nearby tubing.

  (c) Explosion proof conduit systems with loose/missing covers and missing bolts.

  (d) Bolts missing from relief valve and interstage scrubber flanges.

  (e) Oil on the steel deck under the engine/compressors.

  Similar problems were found at the three outdoor compressors east of 35R compressor building.

- Compressor K-3 in the 35R building had more than a dozen short bolted connections at compressor valve covers. Full thread contact is necessary to reduce the chance of the compressor valve cover being blown off and a fire occurring.

- Compressors at 36RDGZ station had excessive lube oil and glycol leakage.

- Production facilities at the unattended 18G facility had several discrepancies. Among them were:

  (a) A gas leak exists at the diaphragm of the Fisher controller which regulates the gas supply to the 18G heaters.

(b) The gas scrubber for the heater has many "short bolts" thereby reducing the holding power at the bolted connections. The vessel has been rated at 600 psig working pressure but is currently operating at a much lower pressure.

(c) Several electrical seal fittings have no poured seal: some do not have a threaded plug in the fitting. These discrepancies void the electrical classification for the fittings.

(d) Expanded metal grating is not in place at the water draw pit at #6 train run tank.

- o There are two vapor recovery compressors at #6 location but only one in service. They service the large tank at the top of the hill and the 18 tanks which comprise the LACT tanks. If the operating compressor shuts down, the vapor pressure on the 19 tanks will increase and will cause eventual discharge of hydrocarbon vapor into the atmosphere through the p/v valve on the tank roofs. This condition will exist until someone drives by the compressors at the unattended facility and notices that the compressor is down. An alarm to a control room area does not exist.

- o Three pumping units were visited. Two had working surfaces (warped and split boards) at the pump rod area which could cause someone to fall.

CONCERN: See OS.5-4

FINDINGS:

- o Operational orders are given by the shift foreman; the orders are recorded in the facility log book.

- o Loaders were observed to not ground the trucks prior to attaching the hoses to the trucks. This is in violation of BPOI Operating Instructions #1734-010, page 4, item 3a.

- o Loaders have been instructed to read and initial the Emergency Response Guidelines but all of them are not complying.

- o Loaders had tagged a propane loading hose with a one-piece DANGER tag and wrote on the tag: "LOADER BAD HOSE". The tag did not display the date, nor the identity of the person placing the tag although the tag design had headings for name and date. One-piece tags were discontinued on July 17, 1987, when the new tag policy was published. Loaders are not using the rack until the hose is replaced.

- Three loaders were asked whether they had ever seen the Safety and Health Bulletin which is frequently published to alert employees of hazards. None of the three had seen nor knew of the bulletin.

- The notification in the loading rack log book of the Appraisal Team's visit stated: "Don't let drivers stay at the truck, make them stay in building". This particular instruction from management was ignored. Drivers were at the trucks, not in the building, during two extended periods of observation.

- Product Sales Operating Instructions #1734-010 do not require drivers to leave the loading area.

- A relief valve was discharging a stream of liquid from the drips accumulator vessel at LTS-1 onto the ground beneath the vessel. The area gravel was saturated with the heavy hydrocarbons. The operator said the relief valve was not discharging when he had passed by an hour earlier on his tour of the unit. He stated that maintenance had worked on the valve before and that he would contact maintenance immediately.

- A heater flange leak at LTS-1 therminol heater is smoking and exists near the ladder at one end of the heater. It would be hazardous to climb the ladder whose purpose is to permit observation of the heater tubes and gas burners/pilots. Observation is restricted, therefore, to using the ladder and peep hole at the other end of the heater. Both ends of the heater should be accessible so that hot spots on the tubes, uneven firing pattern, etc, can be noticed and corrected.

- A leak of 90 drips per minute at the upper threaded union of a level controller at the 36R compressor area (west compressor first stage scrubber) was observed and brought to the attention of gas operations personnel who immediately acted to stop the leak.

- A small stream of oil was flowing on the surface of the ground at the west compressor at the 36R location. It was coming from some unknown source near the compressor concrete pad and flowing downhill. The gas operations employee was uncertain as to the source but stated he would investigate it. He suspected possible corrosion at a small container.

- A compressor operator at 35R identified valves below and outside of the compressor room which he is expected to handle when starting up or shutting down a compressor. The valves were difficult to reach and could result in back injuries, hernia, etc.

2 OF 2

- o Numerous other problems such as voided explosion proof electrical systems are mentioned elsewhere in this report.

CONCERN: See IH.2-1

FINDINGS:

- o Transport trucks are supposed to be grounded prior to the loaders connecting hoses to the trucks. The intent is to drain static charge from the trucks rather than have a static charge dissipate across the hose connections during hook-up. A possible explosion is thereby avoided if hydrocarbon does leak through the hose valve during hook-up because the built up static charges have been removed.

- o Electrical systems prevent starting the product pump until the truck is grounded, however, as long as the first truck continues to be grounded, a second truck can be loaded simultaneously because the pump is operating due to the first truck being grounded.

- o An explosion hazard exists at the loading rack because a truck can be loaded without first being grounded due to the design of the pumping system. Operating Instruction #1734-010, pages 4-5 require a truck be grounded before opening the product hose valve. The present electrical system does not assure that a second truck is grounded prior to attaching hoses as desired.

- o Propane, butane and gasoline are loaded onto trucks at the loading racks. Emergency Shut Down (ESD) valves are located at the south end of each rack and inside the control room. There is no ESD valve to the north of the loading racks in the event of propane/butane/gasoline leaks except for an ESD inside the control room.

CONCERN: (OP.1-1) Modifications have not been made to the present loading rack facility emergency shut down and grounding systems which would improve operational safety.

FINDINGS:

- o Three drilling rig sites were visited. The drilling rig (Cleveland #1) east of 35R was found to have:

  (a) Different relief valve settings at the two mud pumps. The relief valves are tripped when a shear pin is sheared. The valve setting is determined by putting the shear pin in one of several different holes in the relief valve. The pin position was different at the two different valves.

  (b) A bolt missing from a flange near the mud pump pulsation dampener. The line pressure was 3500 psig.

(c) A metal floor in the switchgear room. A rubber, or other non-conductive material, floor mat is usually found in such buildings to provide safety to the person who must stand on the floor to throw the electrical switches. This is an electrical hazard.

CONCERN: See IH.2-1, IH.2-2, and OS.5-4.

FINDINGS:

- o There are no posted instructions for propane, butane and gasoline loaded onto trucks at the loading racks.
- o Safety notices are published under the title of Safety and Health Bulletins but distribution is poor.
  - (a) Three loaders at the loading rack stated they had never seen the safety notices.
  - (b) The bulletin board at LTS-1 had a February, 1987, issue and an issue from this year posted. The operator presumed no others had been sent to the unit because they were not appropriate to operator needs. There were 13 missing issues between the two posted bulletins.
  - (c) An operator at 35R had most of the bulletins but stated that he only glanced at them when they arrive because they contain restatements of known material.

CONCERN: (OP.1-2) Safety communications are not effective.

FINDINGS:

- o At the Loading Rack, trucks are approximately 50 feet apart during loading, the loading pad is level which aids personnel and prevents flooding of truck relief valves, sturdy barricades protect loading equipment from being damaged by trucks, an ESD shuts down all loading lines, and a fusible link valve is on the line which returns vapors to storage.
- o The Loading Rack handles butane, propane and gasoline. A ground clamp must be attached to the unpainted bare metal of the truck and provide a good conductance of static charge before the product can be pumped into the truck. Personnel were asked to remove the ground clamp from a truck during loading. As the clamp was removed, the pump immediately stopped because a ground to the truck did not exist. The equipment operated as intended.
- o Some operators at the gas processing plants were observed performing their duties in a safe and diligent manner. Some of the duties which were observed were:

(a) starting a gas compressor

(b) adding glycol to the reboiler

(c) adding lubricant to cooling tower fans

(d) making their rounds of the unit.

- Some systems were checked for operator performance and thoroughness. An example of proper performance was that found at the K-38 compressor (LTS-2). A flywheel lock was not in place while maintenance personnel were overhauling the compressor. Upon notifying the operator of the condition, he quickly produced the flywheel lock which was on the floor near the flywheel, and stated that it was only temporarily removed so that maintenance personnel could adjust the timing on the engine. His response and reply indicated knowledge of the purpose of the safety device. The device is a means of locking the crankshaft and preventing piston movement while personnel have their hands inside the cylinder. Maintenance personnel were observed making adjustments.

- Several observations were made of gas compressors and engines undergoing Beta engine analyzer tests. The tests are performed monthly on each compressor/engine. The tests are a preventive maintenance measure and provide photographic representations of valves opening, closing, etc. Experienced personnel armed with a history of a particular compressor/engine can determine when compressor valves have blow-by, are not seating properly, and other deficiencies leading to poor efficiency, equipment failure, and equipment wear.

CONCERN: None

PERFORMANCE OBJECTIVE: Operating procedures and documents should provide appropriate direction and support to the safe operation of the facility.

FINDINGS:

- Operational procedures regarding start-up, shut-down, and blinding were reviewed and found to be acceptable.
- Lockout/Tagout procedures were reviewed and are commented on elsewhere in the Operations section. (See Concern OP.3-1)
- Material Safety Data Sheets (MSDS) were visible at all gas processing facilities and employees spoke of receiving considerable information about MSDS and chemicals at safety meetings.
- Operating Instructions were found at all but the 35R compressor room. Operators do not receive a personal copy of the Instructions but may obtain a copy if they desire.
- Operating Instructions for starting and loading Clark compressors need to be clarified because of errors and omissions. Typing errors are also evident. The rewrite has begun as the result of this observation.
- Typos were found in numerous publications. Examples are: incorrect area code in the Drilling Operations Manual, #14610-001 page 1 for contacting Red Adair by telephone in the event of a blow-out; "so" was typed instead of "do" in #1731-005 page 3, #4; drawing 1732-025 shows an "areal cooler" instead of an "aerial cooler", etc.

CONCERN: See MC.7-2.

PERFORMANCE OBJECTIVE

Personnel should know of the status of the systems and equipment under their control and ensure that systems and equipment are controlled in a manner that supports safe and reliable operation.

FINDINGS:

- o Shift logs and records are well maintained.
- o Gas plant operators tour the unit at a minimum of two times per shift to record process conditions, i.e. temperature, flow, etc.
- o Personnel at LTS-1, 35R and the Loading Rack are not completing the back side of the Fire Permit form prior to issuing a permit for work within the facility. The Fire Permit, form 12-037, states that all items on the back shall be checked off before signing the form.
- o The Loading Rack uses a duplicated copy of the Subcontractor Work Permit form WB17-021. The back side of the xeroxed copy is blank yet the front side states: "I have read and understand the safety rules for Subcontractors as listed on the reverse side" and the reverse side is blank.
- o Policy & Procedure #1220-001 and #1200-002 provide instruction for the proper implementation of the lock and tag procedures. Page 2 of #1220-001 states that the Department Manager is responsible for the maintenance of a log for controlling and tracking tagging materials and checking the log on a monthly basis for the status of outstanding tags. Operators at 35R, LTS-1, HPI and the loading rack are not maintaining a status log as required by the Policy. When asked how many locks and tags are on their equipment, they cannot readily answer, although they do record the use of locks and tags in the facility Daily Log.
- o Operators believe the two-part tag is intended for maintenance jobs but agree that the tag can be used during normal operations when they wish to tag a valve at the facility. The previously used one piece tag has been discontinued in favor of the two piece tag as per the Policy. Despite this, the Loaders continue to use the one piece tag, having placed a one piece tag on a defective hose during the appraisal visit.

CONCERN: (OP.3-1) Operators fail to use proper facility status controls,i.e., Fire Permit and lock/tag procedures in accordance with Policies. Also see Concern IH.2-1.

FINDINGS:

- Personnel are making their rounds at the process units.
- "Blinds" are circular steel plates which are inserted between pipe flanges to prevent the passage of gas/liquid. Blinding of process piping is on a case by case basis. Blinds are numbered. There is good control of blinds and blinding tags.
- Operator's logs were reviewed and contained sufficient operating data.
- A vacuum truck driver and operator were interviewed to substantiate that the driver had received operator approval to enter the area.

CONCERN: None.

OPERATIONS STATIONS AND EQUIPMENT - OP.4

PERFORMANCE OBJECTIVE: Control stations and facility equipment should effectively support facility operation.

FINDINGS:

- Operators at the process units rely on alarms and telephones. Production personnel rely on 2-way radios. (See Concern PP.4-1)
- Units are supplied with safety showers, first aid kits, ear plugs, and other safety equipment. (See Sections PP.4, IH.2, MA.1 and MA.A)
- Spacing between equipment in most instances meets industry good practices. However, several examples are indicated in FP.7 where equipment spacing fails to meet the DOE "improved risk" criteria.

CONCERN: See PP.4-3, MA.1-2, FP.7-1 and FP.7-2.

PERFORMANCE OBJECTIVE: Operator knowledge and performance should support safe and reliable operation of the equipment and systems for which he is responsible.

FINDINGS:

- Operator training is achieved through on-the-job training and API self study courses until the trainee demonstrates sufficient job skills to be placed on shift alone. Trainees are allowed 90 days to prove competence. The employee is tested by the trainer who uses an established check-off list. If the trainer employee is satisfied with the answers, the trainer recommends promoting the employee. Employees have a training manual or set of procedures to assist them.

- Safety meetings are considered informative by all personnel who were interviewed. The shift foreman attends the meeting and operators feel free to ask questions. They are held bimonthly, alternating with Training meetings. In addition, shift foremen are encouraged to have tailgate safety meetings during the month in which training meetings would be scheduled and employees spoke of attending them.

- One operator, when presented a scenario of a fire situation, was asked what he would do. His answer consisted of closing a valve and getting a fire extinguisher; rather than hitting an emergency shutdown (ESD) button which would be the correct answer. The employee had been on the job by himself for one month.

- Three operators were asked about their opinion of training adequacy. All said that training is better than it used to be but more is needed.

- Certain operators have recently received special training because of their job: Scott Air Pak training, compressor training, and oxides of nitrogen (NOX) training.

- Training check-off lists, filed in the Gas Operations Department, were randomly reviewed for content and thoroughness. They addressed many subjects. They were completed properly.

CONCERN: See MC.6-1.

SHIFT TURNOVER - OP.6

PERFORMANCE OBJECTIVE: Shift turnovers conducted for each shift station should ensure the effective and accurate transfer of information between shift personnel.

FINDINGS:
- o Two shift changes of the head operator position were observed. The outgoing operator reviewed control board changes at the facility which had a control board. Sufficient time was devoted to shift turnover.

CONCERN: None.

F. MAINTENANCE

The maintenance of the production operations and gas operations systems and equipment at NPRC is primarily the shared responsibility of the Facility Maintenance Department and the two Service and Relief groups within the Production Operations and Gas Operations Departments. Maintenance appeared to be performed in a conscientious manner by dedicated people with good working relationships and appropriate coordination between the various organizations involved, including the production and gas operating organizations. Maintenance personnel appeared to be safety conscious, and indicated a desire to improve their safety knowledge and working conditions and practices.

Maintenance activities by all of the organizations involved are performed and controlled under a computerized work order system administered by the Facility Maintenance Department. This computer work control system also serves as an equipment failure and maintenance history data base.

Maintenance priorities are largely driven by the requirement to maintain high availabilities and operating times for the production and gas processing systems. This philosophy of non- stop operations at times inhibits certain types of maintenance from being performed, such as the elimination of lube oil leaks in the numerous large gas compressor engines located on site.

The production and gas plant systems and facilities are being maintained at a level somewhat short of DOE policies and expectations. Some noted concerns include the unknown status of corrosion-related wall thickness reductions in gas plant pressure vessels, the extensive presence of asbestos insulation in the gas plants, the absence of a calibration program for installed instruments, and the lack of system preservation and general-plant-condition maintenance activities. The deficiencies in the status of the facilities is exacerbated due to budgeting priorities.

Other deficiencies noted include a lack of appropriate tracking of maintenance responsibilities (such as the failure to establish a program for unit owned cranes and lifting equipment maintenance and certification), inadequate interface between safety and QA organizations and day-to-day maintenance planning and executions, and the lack of maintenance and operation aids (such as controlled up-to-date drawing sets and the marking and labelling of piping system components).

FACILITY MATERIAL CONDITION - MA.1

PERFORMANCE OBJECTIVE: The material condition of components and equipment should be maintained to support safe and reliable operation of the facility.

FINDINGS:

- The following facilities were visited:
  - 8R Compressor Station
  - 17R Compressor Station
  - 353 17R Well Site (pumped oil well)
  - 117R Tank setting
  - 366A 24Z Well Site (unpumped oil well)
  - 344 24Z Well Site (gas injection)
  - 24Z LACT Station
  - 30R Compressor Station
  - 35R 115KV Substation
  - 35R Absorption Gas Plant
  - 35R LTS-1 Gas Plant
  - 33S Compressor Station
  - 35R Horizontal Well Drilling Rig (Well #372)
  - 17Z Gas Sales Point
- Relief valves examined were consistently found to have valid inspection labels.
- Observations indicated that adequate equipment lubrication programs are in place, both in the field and inside the gas plants.
- Observations at the 36S vehicle maintenance shop indicated that facilities, qualified personnel, and programs are in place for maintaining site vehicles in a safe condition.
- Safety inspections of on-site subcontractor drilling rigs are performed by BPOI on at least a monthly basis. These

inspections are based on a check sheet developed from American Petroleum Institute (API) recommendations and inspection practices of various drilling and oil companies.

- A site-wide leak identification and elimination program has been recently initiated in response to Kern County fugitive emissions requirements. This program includes the use of subcontractor inspection and leak repair teams and will include field piping and equipment as well as the gas plants. The inspection of the field systems is scheduled for completion in January 1989. At that time the leak inspection activities in the gas plants will be initiated. The leak inspection process will be a continuing effort after the site wide baseline inspection is completed.

- At present there is no control over facility-owned crane and lifting equipment inspections and certification. (See Section MA.3)

- There is no program for calibrating installed instruments in the production and gas process systems throughout the facility. (See Sections MA.3 and TS.6)

- The maintenance programs are heavily influenced by the requirements to achieve high availability for systems and equipment. For example, the Facility Maintenance Department has a performance goal of achieving at least 95 percent availability for the large gas compressor engines. Actual availability values seen for these compressors typically range from 91 to 98 percent.

- Personnel protection insulation is not provided on high temperature vessels and piping at some locations in the 35R Absorption Gas Plant.

- Asbestos insulation exists extensively throughout the 35R Absorption Gas Plant and it was observed to be damaged at several locations. (See Sections IH.5 and IH.7)

- When questioned during this appraisal, Facility Maintenance personnel displayed a limited awareness of the location of asbestos in the 35R Absorption Gas Plant.

- A program is in place for establishing baseline information on wall thickness reductions due to corrosion for all of the pressure vessels and piping throughout the site. The baseline inspection for most of the critical high pressure piping in the field has been completed. Only a portion of the gas plant vessels and piping has been inspected. The completion of the gas plant baseline inspection is scheduled for April 1989. At present, the wall thickness status of approximately 80 pressure vessels (mostly in the gas plants) is unknown. (See Section OS.5)

CONCERN: See OS.5-1.

FINDINGS:

- o With very few exceptions, piping valves and equipment are not marked to indicate service or system component identification numbers. This is true at field locations and throughout the gas plants. Facility engineering is presently establishing standard specifications that will provide markings identifying service (but not equipment ID numbers) for new construction and modifications. There are no plans to provide these service markings to existing piping and equipment. (See Section TS.1)

CONCERN (MA.1-1): There is almost a total absence of production operation and gas plant piping system and equipment marking and labelling to facilitate both normal and emergency operation and maintenance.

FINDINGS:

- o During this appraisal it was observed that several emergency showers and eye wash stations in the gas plant did not work properly when tested. (See Section MA.4)
- o Pipe supports do not adequately suppress vibration at some locations in field and plant areas.
- o The wooden stairs, handrails, decks, and platforms at the 35R Absorption Gas Plant cooling tower were found to be in a deteriorated condition.
- o Missing flange bolts were noted at various locations during this appraisal.
- o Evidence of lube oil leaks and resulting oil accumulations was observed at most of the large gas compressor engines examined. Exceptions noted were the compressor engines at the 33S Compressor Station; these engines were found to be relatively clean and free of lube oil accumulations. (See Section OS.5)
- o Piping and equipment are commonly left unpainted and external rusting and corrosion were evident in numerous locations. Many valve bodies seen in high pressure gas and other critical systems (including the ESD actuation systems) had external corrosion.
- o Several other general maintenance and housekeeping deficiencies were identified during this appraisal. (See Sections OS.5 and OP.1)

CONCERN (MA.1-2): Maintenance of the general condition of the facilities is inadequate. Also see Concern OS.5-4.

PERFORMANCE OBJECTIVE: Maintenance should be conducted in a safe and efficient manner to support facility operation.

FINDINGS:

- The maintenance of production and gas processing systems is performed primarily by three organizations:

  1) Facility Maintenance Department: electrical, instrumentation and controls, rotating equipment, relief valves---for both production and gas operations (Facility Maintenance is also responsible for all vehicle maintenance)

  2) Production Operations Department Service and Relief Group: production operation related piping, vessels, valves, insulation, and support structures (Production Operations Department Service and Relief Group is also responsible for all road maintenance).

  3) Gas Operations Department Service and Relief Group: gas operation related piping, vessels, valves, insulation, and support structures.

- About half of the maintenance work is performed by subcontractors working with the BPOI maintenance personnel. Safe work practices of the subcontractor personnel is considered to be the responsibility of the subcontractor organization. This responsibility is transferred to the subcontractors by including BPOI's "Manual of Uniform Rules, Regulations and Safety Requirements for Subcontractors Performing Work at NPRC" as a part of all maintenance subcontracts. The Contract Technical Representative is the principal BPOI interface for assuring that the subcontractor is performing in a safe manner. (See Section OS.2)

- There is close daily communication (primarily verbal) between the three departments and the various groups responsible for operation and maintenance. Early morning coordination meetings are held between these groups on a daily basis. A very good working relationship was observed between the various organizations.

- "Tail Gate" briefings are frequently conducted by the various work supervisors to reinforce safety and good work practices.

- Qualification of maintenance personnel is generally achieved by on the job training. The only certifications for BPOI maintenance personnel are welder certifications for service and relief group welders. These welders are certified per ANSI and ASME standards for pressure vessels and piping.

- Essentially all maintenance work is performed under the work order system maintained by the Facility Maintenance Department. The use of this work order system is required by unit level policy (PPM 1170-004, Work Order System) for maintenance work performed by the Facility Maintenance Department and the Service and Relief groups. It is also used on a voluntary basis by other BPOI organizations.

- All maintenance and associated operations personnel observed were seen to have a very good attitude about their work. The maintenance activities were performed in a conscientious manner and pride was evident.

- Detailed step-by-step procedures are generally not provided with maintenance work orders. The experience and training of the mechanics, electricians, and technicians (as well as the oversite of crew leaders) are relied upon to assure that the work is performed properly. This appeared to be appropriated for the nature of the work most generally being performed.

- The work order form includes a space for workers to provide comments of their observation while they are at the job site. A review of past work orders indicated that the maintenance workers are using this system to identify plant conditions seen.

- Tag out and lock out systems were used as appropriate on the maintenance activities observed. Tag out operations were observed for a maintenance work order (replacement of glycol filters on a reboiler skid at the 8R compressor station). Although unfamiliar with the arrangement of the particular system being tagged out the operator identified the isolation valves to be tagged by manually tracing the lines. The operator did not have system or equipment drawings available for use during the isolation and tag out operation.

- Tag out and lock out requirements are provided in PPM 1220-001 (Tagging and Clearance) of the BPOI Safety and Health Manual. This procedures requires that a log be kept of all tagged-out items. However, it was found that formal logs are not always kept by the operators. (See Section OP.3)

CONCERN: See OP.3-1.

FINDINGS:
- Not all maintenance personnel are provided with controlled system drawings for use in performing their work.

CONCERN: See MC.7-2.

FINDINGS:

- The work control procedures do not require Safety and QA personnel to review planned work unless judged to be necessary by the work order planner/scheduler or the person performing the work.

- The Safety and QA organizations interface roles with maintenance activities primarily consist of scheduled audits. Interviews with key personnel in the Facility Maintenance Department, the Service and Relief Groups within the Production Operations and Gas Operations Departments, and the Technical Assurance Department Safety and QA organizations consistently indicated that Safety and QA Staff members have very little direct involvement with the planning or execution of maintenance activities. The work control system forms and procedures generally do not lead to interfaces with these organizations. The work permit procedures do not require routine review by Safety and QA representatives. Inspection hold points for Safety and QA are typically not included in the work packages.

CONCERN: See IH.2-2.

FINDINGS:

- Maintenance personnel have expressed a concern that training consistent with good industry practices and useful "lessons learned" information from on site accidents and events is not being provided to employees.

CONCERN: See MC.6-1 and TS.2-1.

PERFORMANCE OBJECTIVE: Preventive maintenance should contribute to safety.

FINDINGS:

- o A comprehensive computerized preventive maintenance (PM) system is maintained by the Facility Maintenance Department for electrical, instrumentation, and mechanical equipment maintained by that department. The Facility Maintenance Department work order planner/schedulers regularly review the due dates through the use of the computer system to determine when PM work orders are required.

- o Work is often deferred to accommodate operation requirements. See Concern MA.1-2. Backlogs and deferred preventive maintenance items are continuously reviewed by Facility Maintenance supervisors.

- o The Facility Maintenance Department preventive maintenance (PM) tracking system does not include a means for "discriminating" or "flagging" equipment that is important to safety. Interviews with supervisory personnel in charge of the Facility Maintenance Department PM system indicated that PM tracking personnel do apply special attention to equipment that is commonly known to be important to safety, such as fire pumps. As a practice, general equipment PMs are typically completed no later than 30 days past the due date. A special effort is made to complete PMs for equipment known to be safety related (such as the fire pumps no later than a couple of days past the due date.

- o At the time of the appraisal, approximately 1000 PM items are scheduled for the month with approximately 300 backlog items.

- o The maintenance procedures do not define backlog limitations. Due and past due PM items are accomplished through continual coordination between the Facilities Maintenance Department and the Gas Operations and Production Operations Departments.

- o The Facility Maintenance Department PM system also includes vehicle PM. Vehicle PM is strictly enforced and failure to abide by the procedures for vehicle PM when due results in administrative action by top management in BPOI.

- o Neither the Gas Operations Department nor the Production Operations Department Service and Relief groups perform formal PM scheduling activities. Their work is scheduled primarily based on observed conditions.

- Records of the PM work performed by Facility Maintenance are maintained in the computer data base for the work order system. Hard copy records are also maintained.

- Safety relief valve preventive maintenance (inspection and repair) is performed by Facility Maintenance as required by PPM 15410-002, "Safety Relief Valves". Facility Maintenance has a separate computer system for tracking relief valve inspection. This is reviewed at least monthly for work scheduling with the relief valve subcontractor. The preventive maintenance activity is considered to be on time if it is performed any time during the calendar year that the inspection due date occurs. No backlogs are maintained. The relief valve inspections are performed by subcontractors.

- Policy and Procedure No. 1250-002 of the BPOI Safety Manual places the responsibility for maintenance, inspection, and certification of NPR-1 unit-owned cranes and lifting equipment within the Facility Maintenance Department. During this appraisal it was found that the Facility Maintenance Department had not yet developed a system or program for implementing these requirements. It was also found that there was no control over relevant inspection and certification documentation and records for unit-owned cranes and lifting equipment by any organization within BPOI. When requested, documentation could not be located for review for any of the unit-owned cranes and lifting equipment. Interviews with Maintenance Department supervisory personnel, and their subsequent research into these matters, confirmed these findings. As a result of this appraisal the Facility Maintenance Department is aware of this critical deficiency and has made a verbal commitment to establish a tracking and records management system.

- While observing a Gas Operations Department Service and Relief Group maintenance activity (replacement of a gas line valve at 17Z Gas Sales Point on 9/30/88), it was found that the lifting equipment on a cherry picker type truck (UNX-0600) being used to lift the large valve had an inspection label which indicated that the lifting equipment (S.N. 13249) was several months past due for inspection.

CONCERN: (MA.3-1) Appropriate systems are not in place to assure that NPR-1 unit-owned cranes and lifting equipment are in a safe condition.

FINDINGS: o There is no scheduled preventive maintenance or calibration of installed instruments used for monitoring or controlling system processes in the gas plants and out in the field production areas. The one exception is that instruments used to monitor material transfers for sales accountability are calibrated and maintained through the preventive maintenance program. (See Section TS.6)

CONCERN: See TS.6-1.

PERFORMANCE OBJECTIVE: Facilities, equipment, and material should effectively support the performance of maintenance activities.

FINDINGS:

- Areas and facilities reviewed include:
  - 35R Pump Shop (mechanical maintenance)
  - 36S Vehicle Maintenance Shop
  - 35R Warehouse (material control)
  - 36S Warehouse
  - 35R Instrument Shop
  - Various in-progress work locations throughout site and inside gas plants

  All of these work areas appeared to be orderly and appropriately maintained for the nature of the work being performed. Good housekeeping practices were apparent. Tools are appropriately controlled in locked areas.

- Tools requiring calibration are controlled by a tracking log.

- The warehouse storage areas were clean and orderly. Materials being stored were found to be segregated with appropriated identity control labeling and marking. None of the materials in the warehouse inventory system are formally identified as items critical to safety, therefore there are no special controls established for critical items.

- A computerized inventory tracking and control system is used to maintain necessary spares and material levels. This is periodically reviewed and adjusted as required.

- Appropriate administrative and segregation controls are applied to storage of potentially hazardous and unknown (uncharacterized) chemicals and materials.

- Many of the maintenance activities are performed outside in the field. Work is performed at night as well as during the day, therefore lighting conditions may be less than desirable at times since night work at remote field locations is performed using flashlights and vehicle lights.

- During this appraisal it was discovered that some of the safety showers inside of the gas plants were not functioning, thus presenting a potentially unsafe condition for maintenance personnel. One of the showers tested is, in fact, the emergency shower located in the immediate area of the Therminol burn-injury accident that occurred in 35R LTS-1 during a maintenance activity two weeks earlier. The shower did not function properly at that time either.

CONCERN: See PP.4-3 and IH.2-2.

PERFORMANCE OBJECTIVE: The control of work should ensure that identified maintenance actions are properly completed in a safe, timely, and efficient manner.

FINDINGS:

- The requirements for the control of maintenance work activities are primarily covered by two unit level Policy and Procedures Manuals (PPM's):
  - PPM 1150-000 Comprehensive Maintenance Plan
    Describes the responsibilities and interfaces of the various departments and organizations in performing maintenance activities throughout the facility.
  - PPM 1170-000 Maintenance Control System
    Describes maintenance work control activities.
  - PPM 1170-004 Work Order System
    Describes the use of the work order system.
- Essentially all maintenance activities are performed under the work order system maintained by the Facilities Maintenance Department (including maintenance work performed by other departments). Approximately 4500 work orders are processed each month.
- PPM 1170-004 indicates that work orders are assigned priorities based on safety and plant operation needs. One priority category is "Emergency" which is defined as follows in the PPM:

  > "Safety of personnel or equipment is in immediate danger. Work required to be done right away with paper work, including Work Order, to follow."

- A computer system is used to schedule, track, and document close-out of work orders. This same computer system serves as a data base for maintenance work history and problems noted while performing the work.
- Work activities are prioritized through a process of daily review by the work control schedulers/planners and coordination meetings between the various maintenance and operation groups.
- Interviews during this appraisal indicated that the work order system is being used as intended, but that the actual coordination of the maintenance responsibilities among the

different organizations and departments is being performed to a large extent based on communications and agreements between these organizations and departments rather than strictly following the interface plan described in PPM 1150-000.

- It was also learned that there are plans to revise the unit level PPM 1150-000 Comprehensive Maintenance Plan to more accurately reflect the actual division of maintenance responsibilities between the organizations. The Facility Maintenance Department is developing a new departmental level procedure that will address in greater detail only those maintenance activities performed by that department.

CONCERN: None.

PERFORMANCE OBJECTIVE: Maintenance procedures provide appropriate directions for work and should be used to ensure that maintenance is performed safely and effectively.

FINDINGS:

- Numerous unit level policies and procedures as well as departmental policies, procedures, and operating instructions exist identifying requirements for maintenance activities. The unit level documents are appropriately reviewed and controlled through the BPOI document control system. The documents reviewed were found to have appropriate signatures. The departmental documents are controlled less formally at the department level.
- Step-by-step detailed procedures are typically not used (nor required) during most maintenance activities.
- Vendor manuals and specifications were found to be available for maintenance of major equipment items such as the large compressor engines.
- Policies and procedures were available for critical activities and programs (such as Safety Relief Valve Preventive Maintenance -- PPM No. 15410-002).
- There is a conscientious effort within the Facilities Maintenance Department to continue to update and develop departmental level procedures and operating instructions to formalize practices and administrative systems within that department. The Facilities Maintenance Department also provides appropriate input into unit level maintenance related policies and procedures.
- Controlled as-built system and equipment drawings are not provided to maintenance personnel. (See Section MA.2)

CONCERN: See MC.7-2.

PERFORMANCE OBJECTIVE: Maintenance history should be used to support maintenance activities and optimize equipment performance.

FINDINGS:

- Maintenance history data is being collected and recorded through the facilities maintenance work order system and its computer based tracking and documentation system. This system serves as a comprehensive data base for equipment failure and maintenance activities. The computer system is presently being further developed for specialized failure and maintenance history data retrieval and reporting.
- Equipment failure data is continually reviewed by facility maintenance management and planning personnel. However, there is no formal trending or analyses being done at this time.
- There is no reliability engineer on the BPOI staff at present. This position is shown as part of the work control and review process in the present version of the Comprehensive Maintenance Plan (PPM no. 1150-000).

CONCERN (MA.7-1): Formal detailed equipment failure analysis and trending is not being performed.

G. TECHNICAL SUPPORT

Technical Support activities are intended to enhance the mission and function of operating groups. At NPR-1 these activities are adversely impacted by a general lack of formal programs. No concentrated efforts are implemented to evaluate lessons learned from experience, for example, although several departments do some analyses on their own initiative. Further, technical support may be ineffective because of the widespread lack of provisions for an independent review to evaluate the effectiveness of the various operations and programs. The lack of such independent evaluations can result in technical support activities working to solve the wrong problems, or worse, attacking the right problems with the wrong resources.

Some programs that are specified in BPOI procedures are not effectively implemented. Many of the elements of the Quality Assurance Program, such as calibration and control of non-conformances, have minimal to no implementation. Some programs, such as control of suppliers and of special processes (like Non-Destructive Examination) have received a great deal of attention and are effective.

Some programs reviewed were only partially implemented. The team noted that facility modifications were handled very well in the projects reviewed, but that the As-Built drawings were still not available for some months after completion. The receiving inspection program did not provide for an independent review of non-conformances and had no provisions for a Material Review Board. In general, the user made the sole determination as to acceptability of suspect materials. The Analytical Laboratory and inspections programs were found to be operating in accordance with policy and procedures but BPOI has not provided for an independent review to ascertain their overall effectiveness. The appraisal team is concerned that much of the Technical Support activity requires improvement to measure up to good engineering practices.

FACILITY MODIFICATIONS - TS.1

PERFORMANCE OBJECTIVE: Technical support services required by the facility to execute modifications should be carried out in accordance with sound engineering principles.

FINDINGS:

- Procedures for Facility Modifications are documented in the Authorization For Expenditures (AFE) Handbook (Management Control Policy and Procedures 4.3).
- Two (2) typical work packages--PR46310/AFE 73390, "Evaporative Cooling Chemical Control" and PR48740A/AFE 68180 "HPI Gas Injection System Road Crossing Pipe Replacement" (corrosion)--were reviewed and found to be in order, complete, and conformed to procedures Engineering 1300-205 of 5/31/88 "Design Control" and Construction 1610-006 of 4/25/88 "Construction Project Responsibilities". As-Built drawings were not completed on these projects at the time of the review, however.
- QA records for AFE 68180 were impounded by the Audits Group because of a subcontractor dispute. These were subsequently reviewed and found to be in order. A post completion document review audit was conducted by QA. No discrepancies were noted.
- There is some flexibility in the AFE Design Review procedure permitting 30 percent and 75 percent design reviews to be bypassed by direction of DOE/NPRC for small projects.
- It took fourteen months (from 5/2/86 to 7/20/87) to get approval of PR46310/AFE 73390 because the committee disapproved higher cost, more automated optional designs.

CONCERN: See MC.1-1.

FINDINGS:

- BPOI subcontractors installed the projects reviewed as described above.
- An inspection of both projects was conducted by the appraisal team. The pipe replacement project was in good order, however there is a widespread lack of identification marking of pipes throughout the field. There are no operational marking standards applied to new or replacement pipe.
- There were no flow markings on the chemical injection project tubing or on the storage tank.

CONCERN: See MA.1-1.

FINDINGS:

- In an inspection of the Chemical Injection project in the 35R gas plant, the Head Operator was not aware of where the project was installed. The chemical tank level was found to be low.
- At LTS-2, the chemical tank was empty but the system was on. The Gas Operations Assistant Superintendent called for an immediate refill.

CONCERN: (TS.1-1) The operators at the gas plants are not familiar with the installation and operation of the chemical injection modification which can cause equipment damage and can permit process safety and control to be adversely impacted.

EVALUATION OF OPERATING EXPERIENCE - TS.2

PERFORMANCE OBJECTIVE: Industry and in-house operating experiences should be evaluated by technical support analysts and appropriate actions taken to improve facility safety and reliability.

FINDINGS:

- o There are no formal programs instituted to evaluate operating experience to apply lessons learned to facility safety and reliability enhancement.
- o Some ad hoc evaluation programs are in place that do achieve positive results. Examples are:
  - Results of safety inspections (discrepancies) are closed only when a work request for corrective action is written.
  - Production operations daily well reports and lost production reports result in correction of discrepancies to restore operations.
  - Maintenance monthly cost report (variances) indicates where resolution of recurring maintenance problems will enhance reliability. Also, a new maintenance failure analysis program (soon to be implemented) addresses equipment reliability concerns. (See Section MA.7)
  - Gas operations analyzes trends in hydrogen sulfide and carbon dioxide concentrations that may cause problems with sales gas, corrosion build-up, and glycol problems in the process. Secondary effects of the concentrations could result in safety concerns (leaks, contamination, etc.). This trending is expected to result in a corrective action work request in the future.
  - Numerous recipients of Analytical Lab data (e.g., Environment, Engineering, Operations, etc.) use these data to track and/or verify special interests.
  - Some evaluations of laboratory reports are used in project planning and implementation on an ad hoc basis, such as in the corrosion program.
- o No industry experience/data is used to promote safety and reliability with the exception of trade and professional publications (e.g. Oil & Gas Journal, Oil World, etc.).

- The following actions were reported as examples of programs that exist to use lessons learned:

  - Follow-up on recommendations from Type A, B, and C Investigations, fire reports and personal injury reports

  - Close out of SAR activities, new SAR activity

  - UOR tracking and close out

  - Emergency response team critiques of drills/real time response

  - Annual review of Policies, Procedures, and Operating Instructions

  - Follow-up to QA audits, safety audit and inspection, and DOE safety inspections

  While these are all valid in-house, on-going activities, they are not identified or documented as part of a program to apply lessons learned to improve facility safety and reliability. Programmatic documentation was not provided to the team. Operations and Production Managers were not aware of any formal programs.

CONCERN: (TS.2-1) Institutionalized programs are not evident to use lessons learned from experience to improve safety.

PERFORMANCE OBJECTIVE: Provisions are established for the control of purchased material, equipment, and services; for selection of suppliers; and for assessing the adequacy of procurement activities.

FINDINGS: o Procurement practices are described in Policy and Procedures Manual 718 series and documented in procedures in the Buyers Guide.

- o There is no formal number assigned or document controls imposed on the Buyers Guide. It is maintained by the Acquisitions group. (See Section MC.6)
- o There are provisions in the Buyers Guide for extensive use of check lists, documentation and records, and cross-check of records, authorizations, representations and certifications. (See Section OS.4)
- o Suppliers are required to provide reports of their activities which are inspected and/or monitored by subcontracts administration and/or quality assurance personnel.
- o Three AFE procurement packages, selected at random, were reviewed for compliance to procedures. These were for subcontractor work and included pre-award survey check-lists, quality plans, and related required data submittals.
- o Job sites are inspected by BPOI personnel or their designated inspection subcontractors for compliance to contract requirements, and are documented in reports.
- o Emergency procurements are normally expedited through the Procurement Operations Center (POC) either by telephone or radio communications.

CONCERN: None.

ANALYTICAL LABORATORY - TS.4

PERFORMANCE OBJECTIVE: Analytical laboratories are organized to provide technical support measurements, analyses, calculations and data to facility organizations requiring this service. They are staffed with trained, experienced, and qualified persons and operate in accordance with documented procedures. Their operation shall support the facility in a timely and effective manner.

FINDINGS:

- Effectiveness of the Analytical Lab activity has never been independently evaluated. Audits have been performed but there has been no independent evaluation.
- Acceptance criteria for Natural Gas and Liquid Products are documented in the contract. Water specifications are in the Production Operations Manual, Section 15.3 (circa 1987).
- The Analytical Lab does not have a copy of the 1987 procedure; instead, the laboratory only has a copy of the 1985 Williams Brothers procedure.
- Off-specification reports, such as excess moisture content, are provided to management by the Lab, but these are never timely enough to predict operational problems; instead, they determine the magnitude and extent of the existing specification problem.
- Off-specification reports for natural gas are not capable of preventing the sales of natural gas, which is sold continuously, because of the time constraints on completing analyses. This was a finding of a prior appraisal.
- The laboratory is staffed by personnel with appropriate educational backgrounds and operational experience.
- The lab has no formal training records. Some on-the-job training has been accomplished; however, they lack documentation.
- Calibration of Lab equipment is performed per schedule and procedures and meets the requirements of QAPPM 22.12 "Control of Measuring and Test Equipment". Status marking of lab instruments is very lax except for calibration of sales meters which are well-marked and identified.

CONCERN: See MC.5-1.

RECEIVING INSPECTION - TS.5

PERFORMANCE OBJECTIVE: Provisions are established for the inspection of purchased material, equipment, and services in accordance with documented procedures by trained personnel.

Provisions are established to assure that documented evidence of the conformance of material and equipment to procurement requirements is available at the plant site prior to installation or use.

FINDINGS:

- Receiving requirements and procedures are documented in Operating Instruction 750-101R2 of 11/2/87.
- There is no technical inspection in receiving. Technical inspections are normally provided by users if technical requirements are defined in the procurement document.
- Some contractor inspection is used on a selected basis when required by specific procurement documents.
- Inspection and test tools are not used by receiving.
- No formal Material Review Board system exists. The user or requisitioner signature is the only check on acceptance of nonconforming items.

CONCERN: (TS.5-1) No Material Review Board process is used to disposition nonconforming items and no provisions for independent review of nonconforming items are provided at Receiving.

FINDINGS:

- The Receiving Technical Support Section appears to be limited to accounting and/or procedure development.
- Receiving has not had an independent review to evaluate effectiveness of the operation as required by DOE order 5700.6B under the Bechtel contract.

CONCERN: See MC.5-1.

FINDINGS:

- No training plan exists per Receiving Operating Instruction #730-070R1, but some limited training records are in evidence.

CONCERN: See MC.6-1.

FINDINGS:

- Property Identification is in compliance with Operating Instruction #750-020R2; however, no marking standards are identified in the procedures, therefore when materials are not marked, the potential for issuing incorrect parts is increased.
- The Warehouse depends on bin markings and computer lists to verify the identity of materials and components.

CONCERN: (TS.5-2) No marking standards are included in Receiving procedures.

CALIBRATION PROGRAM - TS.6

PERFORMANCE OBJECTIVE: Provisions are made to assure that tools, gages, instruments, and other measuring and testing devices are properly identified, controlled, calibrated, and adjusted at specified intervals.

FINDINGS:

- o There is no formal, site-wide calibration program at NPR-1 and calibration facilities are minimal. There is no documented system for recalling equipment requiring re-calibration.
- o There are several autonomous calibration activities in which the equipment to be calibrated is assigned as follows:
  - Down-hole instruments to Production Operations
  - Surface instruments to Facilities Maintenance
  - Analytical Lab. equipment and gas sales meters to the Analytical Laboratory
  - Safety instruments and environmental instruments to the Safety Department calibration subcontractor
  - Corrosion instruments are calibrated by the Corrosion Engineering staff in their office space.
- o Standards traceable to the National Bureau of Standards (NBS) are used by Corrosion Engineering and subcontractors only.
- o No records or justifications are kept for instruments not requiring calibration. Instruments not requiring calibration are usually not marked.
- o QA does not have a master list of instruments that should be calibrated in order to provide for independent verification. Apparently such lists do not exist.
- o Marking of calibrated installed instruments is inconsistently implemented, except for sales meters, which are well-marked as to their calibration status.
- o Calibration records are informally organized and maintained. The Corrosion Dept. has a good records system which is superior to other departmental records.

CONCERN (TS.6-1): Calibration activities do not meet the requirements of the QA Manual Section 22.12 with regard to calibration coverage, status marking, and proper documentation.

QUALITY ASSURANCE - TS.7

CONTROL OF NONCONFORMING HARDWARE - TS.7.a

PERFORMANCE OBJECTIVE: Provisions are established to control the use or disposition of nonconforming hardware, materials, parts, or components.

FINDINGS:

- The Nonconformance Reporting (NCR) System is described in QA Procedure 22150-002. A note in this procedure indicates that this system is not intended to duplicate other formal systems of reporting.
- No group or department has implemented the NCR procedure in its entirety.
- Other reporting systems in use are a collection of function-specific daily logs or incident report forms and sheets such as the "Open, Short, Damaged" sheet used at receiving.
- Field correctable problems - such as repairable welds - are noted on weld reports and repaired, but are not reported as non-conformances.
- There is no central clearing house for gathering non-conformance data, analyzing it, and using it to identify and correct problems except on an ad-hoc basis.
- Incidents are generally closed out by the user and do not have independent review provisions unless a special investigation is required.

CONCERN (TS.7-1): The Nonconformance Reporting system is not implemented and systems used do not meet the DOE Order 5700.6B, "Quality Assurance", for corrective actions.

PERFORMANCE OBJECTIVES: Activities affecting quality, including the items from activities performed, are inspected.

Organizational responsibilities and qualifications are established for individuals or groups performing inspections.

Prerequisites are provided in written inspection procedures with provisions for documenting and evaluating inspection results.

FINDINGS:

- The Safety Department conducts an inspection program of all facilities/operations in accordance with tailored check lists. A minimum of 4 inspections per month are required to meet superior award fee criteria.
- The safety inspection checklists are not designed for in-depth coverage and therefore find obvious deficiencies only. Discrepancies must be addressed by a work request in order to close out the inspection findings. A status checking log is used by Technical Assurance Management to follow the findings and recommendations through to completion.
- A corrosion inspection program covers site-wide facilities and is documented in the Engineering Procedures Manual.
- Corrosion coupons are tested in the analytical laboratory.
- Non-Destructive Examination (NDE) inspections are conducted by an inspection subcontractor in accordance with project requirements.
- The QA department conducts pre-award vendor surveys when required and audits the vendors on a scheduled basis.
- QA also conducts compliance audits of procedures but does not verify that procedures are adequate.
- There is no receiving inspection capability, except visual checks for obvious damage. Occasionally, when receipt inspection is required, it is performed by a subcontractor. Most frequently, the user/requisitioner must perform his own receipt inspection. (See Section TS.5)
- Materials Control was notified of the nationwide problem of counterfeit fasteners. Since very few code fasteners are in use at NPR-1, it was decided not to implement a review program.

- o Requirements for project inspection are part of the Authorization For Expenditure (AFE) work package. Failure to properly specify requirements for inspections is supposed to be corrected during the design review process.

- o Some difficulty in performing self-inspections has been encountered in the past through failure to specify detailed inspector qualification requirements and/or certifications in a subcontractors work package. Corrective actions on this matter were developed through the QA audit process.

- o The Procurement and Property Department has implemented a self-inspection program for compliance to Policies and Procedures in Procedure 712-005. The Self-Inspection program is implemented by the QA coordinator.

- o Inspector qualifications programs, except for NDE inspectors, are not in evidence. Much inspection activity is carried out by qualified subcontractor inspectors.

- o There are no provisions in any department for independent verifications and evaluation of the program effectiveness.

CONCERN: See MC.5-1 and IH.2-2.

PERFORMANCE OBJECTIVE: Provisions are established to assure the acceptability of special processes such as welding, heat treating, nondestructive testing, and chemical cleaning, and that special processes are performed by qualified personnel using qualified procedures and equipment.

FINDINGS:

- Special processes most frequently used at NPR-1 include welding, radiographic testing (RT), ultrasonic testing (UT) and dye penetrant testing (PT).
- Control of Non-Destructive Testing (NDT) activities is in accordance with Construction Procedure 1620-006.
- The designated lead inspector in the Construction Unit maintains all records of certifications of BPOI inspection personnel and certifies all welders.
- Each individual welder must pass a documented test and his work is certified by a qualified and certified inspector.
- Certifications are withdrawn from welders who have frequent rejects by removing their qualification cards.
- Certifications of subcontract inspectors are part of the procurement package.
- Radiography and welding standards and procedures are documented in Operating Instructions (OI) #1620-003 and -004.
- Soil testing and pressure testing work is all currently subcontracted to qualified vendors. Procedures are in place to govern these activities in OI #1620-001 and 1620-005.
- Corrosion program records are controlled in a manner similar to those for other NDT operations.
- There are no provisions for authorized inspectors signature on ultrasonic test (UT) results sheets, Form 1350-005 Attachment 22. These records do not contain inspector identification. There are provisions for signature on Inspection Report 1350-005 Attachment 31, however.

CONCERN: None.

SUPPLIER CONTROL - TS.7.d

PERFORMANCE OBJECTIVE: Provisions are established for the control and selection of suppliers and for assessing supplier adequacy and quality.

FINDINGS:

- Suppliers are selected and controlled through a series of procurement document reviews, pre-award surveys, audits, and review of supplier performance.
- A majority of on-site work is conducted by subcontractors who are reviewed for technical, safety and quality assurance qualifications.
- Records of qualified vendors are maintained.
- Subcontractor personnel responsible for accidents or incidents are penalized by banning them from further work on the site for a period appropriate to the nature of the incident. Subcontractor organizations have not had similar sanctions imposed for poor safety records. (See Section OS.2)
- A vendor rating system is utilized and vendors are provided with a safety requirements manual and Quality Assurance Program requirements per Specification No. EH-A-1086.
- The QA department maintains a file of acceptable vendor QA programs.
- Spot checks of more than a dozen frequently used subcontractors indicate that supplier control procedures are implemented and are apparently effective.

CONCERN: None.

IDENTIFICATION AND CONTROL OF HARDWARE/MATERIALS - TS.7.e

PERFORMANCE OBJECTIVE: Provisions are established to identify and control hardware, materials, parts, and components as well as to assure that incorrect/defective items are not used.

FINDINGS:

- Identification and control of hardware and materials is documented in the 730,740,750, and 760 series of operating instructions.
- The Materials Control Organization has concentrated on Inventory Reductions and eliminating duplicate stock items in the past year.
- Adequate facilities are provided for handling, storage and safeguarding of sensitive, hazardous, and/or unacceptable material, but flammable material storage cabinets in the warehouse are not grounded. (See Section FP.6)
- Very few items with limited shelf life are stocked at NPR-1. Shelf-life items handled, such as paint, do not require detailed tracking systems because they are used immediately.
- Tracking systems are sufficiently cross-referenced to locate and identify materials and components.
- Engineered items depend on the user for verification of adequacy and acceptance.
- BPOI has no marking and tagging procedures for materials because no marking standards are contained in procedures. Marking and tagging of Over, Short, or Damaged items is acceptable.

CONCERN: See TS.5-2 and IH.6-1.

H. MANAGEMENT CONTROL

The BPOI organizational structure is clearly defined. A technical assurance organization has been staffed with some qualified individuals to overview activities associated with safety, health, environment and quality assurance. The technical assurance staff has more than doubled since BPOI assumed operating responsibility. However, within BPOI, some key technical skills are still missing or weak, such as reliability engineering, hazardous material handling, transportation safety, OSHA oversight, and emergency response.

Stringent qualifications do not exist for new hires for operations and maintenance. On-the-job training and some formal training is provided. Training standards do not uniformly exist, much training is not being controlled, training records do not document performance and are not being coordinated, nor have the analyses of safety occurrences been used to help design training programs.

Corporate support to safety issues is evident based on several activities, including numerous communications and written policies and procedures; establishment of quantified safety objectives against which trends are analyzed; and initiation of a new procedure (in August) that requires an intensive and escalating level of management involvement in the review of accidents and development of corrective actions. Although accident statistics are provided to top management for review, this information does not identify high risk areas within BPOI departments.

Authorization and project funding is a complex activity that requires a consensus be developed to support any single project. This process tends to inhibit the correction of recognized safety problems. DOE/NPRC has the authority to act unilaterally on projects, but such action was not evident with regard to proposed projects in the past. For example, fire protection measures, pressure vessel testing, asbestos removal, and gas plant flooring changes have not been agressively pursued.

Document control systems have been established to assure that procedures, instructions and drawings are kept up to date. However, their application to several guidance documents is not consistent and a number of important manuals could not be verified as the latest approved versions.

Facility activities are assessed, but the technical assurance staff is not spending sufficient time in onsite audits and inspections which would provide independent verification of NPR-1 program effectiveness.

A positive safety culture has not yet uniformly filtered through the organization from management to field personnel. Safety policies have been established to improve safety consciousness within BPOI, however, implementation of these policies are dependent upon the personal commitment of individual supervisors and are inconsistent. Management has been inattentive to specific safety actions and interactions which would promote improvements to the BPOI safety culture, routine participation of supervisors in work unit safety meetins, focus on transportation safety, development of an effective emergency preparedness program, and aggressive follow-up on safety recommendations and corrective actions.

PERFORMANCE OBJECTIVE: Management should organize and administer the operation to provide for effective implementation of site activities relating to safety, health and quality assurance.

FINDINGS:

- The BPOI organizational structure is clearly defined with each of the operating activities organized along major functional lines. Independent technical assurance and audit organizations are responsible for overview, audit, and verification to assure BPOI management that the operating activities are performing satisfactorily with regard to safety, health and quality assurance.

- BPOI has identified numerous safety problems that have been recommended for funding. Some safety problems have been fixed; for example, the replacement of corroded high pressure pipe lines. All current projects are prioritized as a part of the annual budget cycle.

- As a project moves from planning to implementation, it receives an identification number and an initial AFE (Authorization for Expenditure) number. The AFE is formally reviewed by the operating committee. Projects that require Unit funding must be approved by both the Government and the Chevron member of the Operating Committee. Even if approved, any project including a safety related one, is subject to later review and modification and/or cancellation if unanticipated events require funding and preempt its priority.

  This process requires that a consensus be developed between the owners (DOE and Chevron) and the operator (BPOI) to support any single project. Several safety projects have been approved for funding but have been overcome by subsequent events and either cancelled and/or postponed due to lack of consensus.

- The Safety Analysis Review (SAR I) of the 35R Gas Plant, completed on March 31, 1986, noted some deficiencies concerning the seismic design. In this regard, BPOI has recommended four projects for study and installation. CUSA position is that the plant was built in the early 1950's and that the current seismic design criteria do not apply. Furthermore, CUSA believe that the facilities to be adequate. DOE/NPRC has not yet taken a position.

CONCERN (MC.1-1): The consensus process used to develop and implement budget at NPR-1 inhibits the identification, analysis and correction of safety issues.

FINDINGS:

- Staffing of the technical assurance organization has about doubled since BPOI assumed operating responsibility for NPR-1. A core professional staff related to safety, quality assurance, and environment currently exist to support these activities. These are support staffs and the line managers have primary responsibility for the safety, health and quality performance of their operations.

- The safety and health policy to be followed at NPR-1 is defined in Policy and Procedures Series 12, Rev. 6, June 14, 1988. The policy contains the corporate commitment to safety by Bechtel Group, Inc., and that of the General Manager, BPOI.

- The BPOI Quality Program is defined in Policy and Procedures Series 22, Rev. 4, April 14, 1988, and meets the requirements of DOE 5700.6B. Furthermore, quality assurance requirements specific to NPR-1 and based on the 18 elements of ANSI/ASME NQA-1 are provided in these procedures.

- Performance appraisals emphasize quality assurance and safety as critical elements in the appraisal.

- The Comprehensive Maintenance Plan (PPM 1150-000) shows that failure analysis and cost investigation are to be performed by a reliability engineer, but this discipline is not currently available at NPR-1.

- Quality Coordinators have been assigned for all departments to act as the primary contacts on quality matters for their departments. A proposal for a Unit Procedure governing the activities of the quality coordinators was prepared and submitted for consideration in 1987. The proposed procedure to formally define the responsibilities of the quality coordinators has not yet been approved.

CONCERN: None.

PERFORMANCE OBJECTIVE: Facility management objectives should ensure commitment to safe operation, including enforcement of work practices and procedures.

FINDINGS:

- o BPOI corporate management has continued to express its commitment to safe operations at NPR-1. In a letter to all BPOI employees dated August 1, 1985, D. A. Greenberg stated that "There is one area which has received much attention, and which will be a high priority item - Safety. Quite frankly, the safety record here at Elk Hills is unacceptable."

- o To monitor safety performance, BPOI has established quantified safety objectives. The 1988 targets and performance to date for BPOI and subcontractor employees are:

	BPOI EMPLOYEES		SUBCONTRACTOR EMPLOYEES	
	TARGET	ACTUAL*	TARGET	ACTUAL*
LOST WORKDAYS	23.22	15.78	28.70	49.90
TOTAL RECORDABLE CASES	3.63	2.93	4.36	8.99
LOST WORKDAY CASES	1.43	1.13	2.52	4.76

*Actual data through August 1988.

Progress against each target is monitored and reported monthly; monthly data is plotted to establish longer term trends. Safety trends are routinely reviewed by BPOI and DOE management at least one time per month, or at a special safety meeting that may be called.

- o Accident incident rates gradually fell from January through May 1988. However, in June 1988, the frequency of accidents increased and have continued to increase throughout the year.

- o Accident frequency data is compiled by the Safety/Health/Security Group. Safety statistics are available at the department level, but specific objectives are not established at the department level. The team compared the safety performance of the NPR-1 unit operator with comparable accident statistics compiled by the American Petroleum Institute. The average results over the six-year period 1982 through 1987 and the CY88 data through August 1988 are as follows:

	TOTAL RECORDABLE CASES ACCIDENT INCIDENT RATE*			LOST WORK DAYS SEVERITY RATE		
	NPR-1 1982-87	API 1982-87	NPR-1 CY88	NPR-1 1982-87	API 1982-87	NPR-1 CY88
DRILLING	8.90	16.79	13.04	55.74	168.50	69.13
PRODUCTION	4.31	2.79	6.92	42.91	20.40	47.05
PROCESSING	4.81	3.82	7.63	29.88	20.23	10.56
ENGR & SVCS	2.11	1.35	0.99	5.76	15.86	16.57
COMBINED	3.89	2.99	5.38	25.76	22.03	29.67

*Injury/illness per 200,000 manhours

The data show clearly that the highest accident frequencies and severity rates are associated with drilling. However, the drilling accident incident and severity rate at NPR-1 are significantly lower than the API reported accident frequency.

- Management of the drilling and workover program was critically examined by the appraisal team to better understand what is being done differently by that department. Drilling is largely conducted under contract; 18 BPOI employees and 258 subcontract employees are associated with drilling. Drilling represents 3 percent of the BPOI manhours and 39 percent of the contractor manhours expended at Elk Hills through June 1988.

  Key elements associated with management of drilling include:

  1. Formal inspection of the drilling or workover rig is made by the Contract Technical Representative (CTR) each time the rig is moved to a new location with changes made as needed to start each job with satisfactory equipment.

  2. Formal review of the subcontractor performance and direct feedback to the subcontractor on his work performance are made by the CTR. Frequently, these reviews result in credits against invoices for work that was not satisfactorily performed. The quality of personnel is also assessed and any unsatisfactory employee performance is discussed with the subcontractor for correction.

  3. Each drilling accident is tabulated and the data analyzed over a several year period. Trends in the accident rate and type are assessed.

  4. Weekly tailgate meetings are held to discuss safety and other issues.

5. Accidents that occurred during a specific month are described on paper. The Contract Technical Representative takes the paper to each rig and discusses each accident and ways to avoid that problem in the future. Each individual working on the rig (all three shifts) sign the monthly accident description report as evidence of this feedback.

6. Formal safety training is provided to each of the BPOI employees. The subcontractors provide training of their employees.

7. The daily drilling report contains a safety category with notes concerning accidents or training conducted. Monthly reports are compiled and submitted for formal review by BPOI and DOE management.

CONCERN (MC.2-1): Rigorous evaluation of the causes of injuries are not undertaken to target department-specific solutions, including training.

FINDINGS:

o Vehicular traffic accidents have increased significantly since 1985:

YEAR	VEHICULAR ACCIDENTS PER MILLION MILES	COST PER 1000 MILES
1982	7.60	$14.19
1983	5.64	5.46
1984	6.60	11.62
1985	6.32	9.45
1986	8.45	5.90
1987	12.77	11.31
1988	10.96	30.75*

* Unit operator $5.76; subcontractors $69.10

o Specific accident reduction targets have been proposed for combined traffic accidents for CY 89, i.e., number of accidents per million miles driven at 10.0 and cost of damage loss per 1000 miles driven at $10.00. In addition, the draft Annual Operating Plan for FY 89 proposes that injury/traffic reduction goals be assigned to each of the departments.

CONCERN (MC.2-2): Vehicular accidents are too high by historical standards.

PERFORMANCE OBJECTIVE: There should be evidence of corporate interest and support for safe operations.

FINDINGS:

- o BPOI corporate policy clearly demands adherence to safety rules and regulations. The corporate policy of "we believe in safety" is reinforced in numerous documents and training aids distributed and used at NPR-1.

- o There is an effective chain of communications in both directions between corporate and facility management. For example, the President of BPOI Petroleum Operations, Inc. receives monthly reports on the operations of NPR-1, including safety. He also reviews summary accident statistics for 1986, 1987, and 1988 (year to date). To provide a perspective, the data are compared to the latest available safety data of the Bureau of Labor Statistics.

  BPOI top corporate management has reviewed serious accidents in detail, including alternative ways that a specific accident may have been prevented.

- o Timely and effective action is taken to review all preventable accidents. The review process is documented in the August 16, 1988 safety and health policy and procedures manual. All preventable accidents are reviewed by management. Repeat violations escalate the level of management review. The General Manager is required to review the facts surrounding accidents and corrective measures taken to prevent future occurrences when a department experiences two or more avoidable accidents in one month. The General Manager has personally reviewed several cases in accordance with this procedure.

CONCERN: None.

PERFORMANCE OBJECTIVE: An established safety culture should govern the actions and interactions of all individuals and organization involved in plant operations.

FINDINGS:

- Quantified safety objectives have been established and safety trends monitored monthly. An accident review policy was established that requires top management involvement.
- Policies have been established that are designed to create a positive environment of safety consciousness.
- A Technical Assurance Department was established and staffed to develop and implement quality, safety, industrial hygiene and fire protection programs.
- Safety policies are being implemented in a non-uniform manner among the work force. Those individual supervisors with a sense of personal commitment in safety matters have modified their day-to-day procedures to improve the safety aspects of their jobs. On the other hand, those without this personal commitment have not changed their ways.
- Although health and safety information is disseminated through a series of Bulletins, their distribution is less than adequate. Some operations had never seen them. (See Section OP.1)
- While BPOI supervisors routinely attend some work unit safety meetings in the field, there is no formal program in place encouraging managers above the superintendent level to attend any of these meetings. (See Section OS.3)
- The considerable efforts by BPOI to upgrade the Technical Assurance policies and standards at NPR-1 are partially negated by the inadequate field inspections and policy enforcement performed by the line supervisors to assure compliance. Further, oversight of field operations is limited by the high ratio of administrative to field functions. (See Section IH.2)
- There is no BPOI policy for the transportation and shipping function at NPR-1. The responsibility is not assigned, and the Safety/Health/Security staff is untrained in motor carrier and hazardous material transportation safety. This lack of focus has resulted in a fragmented program with the transportation of hazardous wastes adequately covered and the transportation of other hazardous materials hardly addressed. (See Section ST.1)

- In addressing major safety projects not approved by the operating committee, BPOI must either defer the projects or find alternate means to work around the safety problems.

- BPOI management has not made a full commitment to support an effective emergency preparedness program: personnel lack proper training, back shifts are inadequately covered, emergency alarms are inconsistent, radio communications are inadequate, equipment inventory control is incomplete, notification procedures are too time-consuming and the plan itself does not meet DOE Orders (See Section PP.2). Directions to limit the program, to the extent that DOE orders are not met, often came directly from DOE/NPRC. (See Section PP.5)

- An explosion in 1981 occurred in the LTS-1 gas plant basement scattering steel plates throughout the operating floor. A recommendation was made to replace these plates with light grating for ventilation purposes and to mitigate the possibility of injury in the event that such explosion occurred again. The cost to make the change was estimated at $30K. The request was refused. (See Section FP.5)

- Contrary to the practices of most major oil companies, NPR-1 does not require the use of safety shoes despite the high risk of foot injuries.(See Section OS.3). Although DOE/NPRC indicates that foot protection has been provided where deemed necessary or required, the prevailing impression at NPR-1 was expressed as "...if we required them (safety shoes) we would have to provide them and that would cost money."

- The non-destructive testing of 80 pressure vessels (most are in the gas plants) has been delayed because the removal of the asbestos has been deferred one year from FY89 to FY90. This results in the current operation of the gas plants under conditions of uncertainty. (See Concern OS.5-1)

- A positive safety culture is beginning to emerge at NPR-1. However, the written policies and procedures developed by management have not been uniformly applied throughout the organization at the working level. Regarding safety, the top and the bottom of the organization are not yet connected. Thus, a safety culture does not now govern the actions and interactions of all individuals and organizations involved in the operation of NPR-1.

CONCERN: (MC.4-1) A satisfactory safety culture is not evident throughout the NPR-1 site.

PERFORMANCE OBJECTIVE: Management and supervisory personnel should monitor and assess facility activities to improve performance in all aspects of the operation.

FINDINGS:

- The technical assurance specialists are performing mostly administrative duties compiling safety data sheets, reporting against Federal standards and California requirements (Proposition 65), and satisfying various compliance needs. Any remaining time is used for mandated audits and inspections, walkthroughs, and visual/exposure monitoring. (These include safety analysis reviews, QA audits, safety audits,and internal audits.) Nevertheless, many required inspections cannot or have not been made (see Sections IH.2, ST.3, OP.1, OS.2, and MA.2). Formal verifications have not been made to determine the effectiveness of field inspections and policy enforcement activities of line supervisors who have the responsibility to assure compliance with quality, safety and health protection.

- No formal independent reviews have been conducted to evaluate the effectiveness of the BPOI environment, health, safety, and quality programs.

CONCERN (MC.5-1): Management is not providing for formal independent verifications or evaluations to determine the effectiveness of the Environment, Safety and Health Program in accordance with DOE Order 5482.1B and other DOE 5480 series orders.

FINDINGS:

- To illustrate some problems associated with Management Assessment, the team reviewed an Investigation Report (Class C) which followed an incident at the Low Temperature Separation (LTS-1) facility on June 10, 1988, and was completed in August 1988. The corrective action letter of Sept. 16, 1988, issued by the BPOI Vice President and General Manager was also reviewed. Both documents raised unanswered questions.

  - The LTS Vessel in question is not identified by an as-built drawing number.

  - There are a number of these vessels in LTS-1 and LTS-2, which were apparently not checked for similar problems.

  - Failure analysis of a sample bolt indicated a wrong bolt was used but there is no indication that the correct bolts were installed initially nor are there records of when maintenance or operations may have replaced those bolts.

- Corrective actions do not indicate a schedule for completion.

- In correcting the immediate problem, the report does not indicate if studs on other vessels were checked for damage. Documentation could not be provided to the appraisal team to show whether or not such action was taken. It was later determined that like studs on the boot of LTS-2 were replaced. No other studs were examined because of insulation covering.

- An Authorization For Expenditure (AFE) has been prepared, but there is no indication how long it may take to implement the recommended programs or whether any of them will be approved.

- There was no QA representation on the investigation team.

CONCERN: (MC.5-2) The incident investigation and reporting system is not thorough, based on the review of the LTS-1 incident report, and it is suspected that there is an unreviewed safety issue on the use of wrong bolts in other areas.

FINDINGS:

o Unusual events are routinely reported in compliance with DOE 5000.3 and DOE 5484.1. Policy and Procedure 22200-001, Rev. 0, August 22, 1986, "Unusual Occurrence Reporting System" provides overall guidance regarding UORs. Policy and Procedure 1210-006, Rev. 1, February 16, 1988, "Notification, Investigation and Reporting of Occurrences" provides detailed guidance regarding safety and health reports and includes Types A, B and C accidents, unusual occurrences and OSHA incidents.

o All injuries are reportable and are recorded on either the "Supervisor's Report of Accident" or the "Injury Reporting Slip" depending upon severity. Guidance is provided in PPM 1270-001, Rev. 1, February 22, 198, "First Aid/Medical Treatment."

o An initial UOR is required to be submitted to the Director, NPRC within 72 hours of the event (PPM 1210-006).

o The examples of unusual events listed in DOE 5000.3 are used by Director, NPRC to provide a generalized definition of typical occurrences which are expected to be reported by BPOI. PPM 22200-001 provides more specific examples of reportable unusual occurrences which include: procedural or material problems in the operation of equipment and facilities, drilling production operating anomalies, unexpected project setbacks, deviations, fabrication or assembly errors, compilation of information on defective equipment, etc.

- The NPR-1 UOR system is one of the contractually required data bases (originally intended to be consolidated and designated the discrepancy data base) which are to be used to identify trends.

- The number of UORs received annually (an average of 33/year) is similar to other DOE installations. However, recent correspondence between the Director NPRC and BPOI (Subject: Unusual Occurrence Reports dated June 30, 1988) show that at least three reports were not received in a timely manner, actually more than six weeks late. More recently, the team observed two unusual occurrences during an orientation tour of NPR-1 on September 14, 1988. Both of these events have been reported as UORs.

- It is common practice at NPR-1 for DOE managers to be aware of candidate occurrences for the UOR system. Follow-up actions by BPOI have been requested when delinquencies were noted. The UOR system is a consideration in the Cost Plus Award Fee evaluation.

CONCERN: None.

PERSONNEL PLANNING AND QUALIFICATION - MC.6

PERFORMANCE OBJECTIVE: Personnel programs should ensure that positions are filled by highly qualified individuals.

FINDINGS:

- o A Technical Assurance Department has been established to develop and implement quality, safety/health, and loss control programs. The staff size has more than doubled since Bechtel assumed operating responsibility. Appropriate job qualification requirements have been established and qualified personnel recruited for management positions that affect the safety/health, quality, and loss control programs. Despite this progress, the team has observed that several key disciplines are missing or weak within BPOI such as: reliability engineering, hazardous material handling, transportation safety, OSHA oversight, and emergency response.

- o A pool of experienced oil and gas operators is limited due to the downturn in the petroleum industry. Recruitment of the most desirable workers at Elk Hills has been difficult due to competition for such employees from new industries locating in the Bakersfield area such as Frito-Lay. Rumors associated with the sale of Elk Hills provide additional uncertainties for the younger employee seeking longer term job security.

- o Vocational/Technical training for oil and gas industry positions has been reduced due to lower demand for these positions by private industry coupled with the withdrawal of "votechnical" funding by the private sector.

- o Stringent qualifications do not exist for new hires for operations and maintenance.

- o On-the-job training is provided to upgrade the skills of the work force, including a requirement for some operators to accumulate API course credits as a prerequisite for advancement. There is no evidence to show that safety incidents have been analyzed at the department level in sufficient detail to prescribe training that may be effective at reducing safety incidence.

- o Training is a decentralized function within the various departments responsible for their own programs. However, no overall training policy and procedures, including standards, are established. No guidelines are provided for developing the programs, from lesson plans to examinations grading and required record keeping.

- The element of coordinating training efforts which are conducted in several areas (such as general indoctrination training for new employees) is lacking. To get the comprehensive record of what any given employee has received, requires input from several departments.

- Because of the lack of centralized training records, the administration of programs with regard to documenting completion of a phase, such as initial training or annual requalification, cannot be controlled.

- Quality assurance trends on a year-to-year basis have been completed to spot program deficiencies. Lack of training to procedures and operating instructions has shown a dramatic increase as a reason for failure; all other failure codes show a positive trend.

- The appraisal team found that training was not provided or was less than adequate to support safety, health, security or quality goals (see Sections ST.3, PP.1, OS.2, OP.5, MA.2, IH.6 and TS.2).

- At NPR-1, about 50 percent of the work force is composed of subcontractors. The BPOI Contract Technical Representatives (CTR) are responsible for monitoring subcontractor performance. This monitoring is dependent on subjective judgments by the CTR's and evaluation of subcontractor's job performance is not consistent.

CONCERN: (MC.6-1) No control mechanism exists to ensure that all persons who require training receive both initial training and periodic retraining to proper standards and that records are established to document training completion and quality.

PERFORMANCE OBJECTIVE: Document control systems should provide correct, readily accessible information to support facility requirements.

FINDINGS:

- Document control systems have been established and are addressed in Unit Policy and Procedures or in Departmental Operating Instructions. Specific documents are being controlled such as: the Policy and Procedures; Operating Instructions; revisions to Gas Plant Operating Manuals; engineering documents produced by Facility Engineering, their vendors and subcontractors; procurement documents; and field changes by subcontractors under fixed price subcontracts.

- Procedures for the preparation, review, approval and issuance of NPR-1 documents are covered in Policy and Procedures Series 1. Drafts of Policy and Procedures will receive appropriate quality and safety reviews, but PPM 110-001 Departmental Operating Instructions do not require such reviews. Recently several departments have proposed converting existing department-specific Policies and Procedures to less controlled Operating Instructions.

- Operating Instructions provide department-specific and detailed step-by-step guidance for hazardous activities of the drilling, production, gas operations and maintenance departments.

CONCERN (MC.7-1): The present review process described in PPM 110-001 (Series 1) for the preparation, review, approval and issuance of Operating Instructions does not assure appropriate quality and safety reviews.

FINDINGS:

- Master lists are available that identify current revisions of procedures, instructions, specifications, drawings, site plans and geologic maps. The lists are maintained in computer data files and are updated in a timely manner.

- Operators and maintenance personnel are not always provided with up-to-date controlled drawings and documents for use in performing their work. (See Sections MA.2 and OP.2)

- The appraisal team also found instances where the guidance documents being used could not be identified or verified as the latest approved versions. These included: Emergency Preparedness Plan, Security Handbook, Procurement Operations Center Desk Procedure, Emergency Response Team Roster (see Section PP.2); Buyers Guide (see Section TS.3); Analytical Lab Procedures (see Section TS.4); Gas Operators Progression Book (see Section ST.1); and the Authorization for Expenditure Manual. (See Section TS.1)

CONCERN: (MC.7-2) All documents that should be controlled to prevent use of out-of-date or unauthorized manuals, books, papers and drawings are not identified, maintained, revised and distributed.

FINDINGS:

- "Red-lined" drawings, which show the "as-built" condition, exist upon completion of subcontract work. These drawings are reviewed by facilities engineering and then sent to drafting for incorporation on the Mylar originals. The current backlog for revising the originals is approximately nine months. During this backlog period, project engineers requiring these drawings will get copies which do not reflect the as-built condition. (See Section MA.2)

CONCERN: (MC.7-3) An effective system does not exist to identify pending revisions in the drawing and documentation lists prior to formal revisions.

ATTACHMENT I

System for Categorizing Concerns

A. Each concern contained in this report has been categorized for SERIOUSNESS by the following criteria:

CATEGORY I: Addresses a situation for which a clear and present danger exists to workers of members or the public. A concern in this category is to be immediately conveyed to the managers of the facility for action. At this point, consideration shall be given to whether a "clear and present danger" exists such that the facility shutdown authority of the Assistant Secretary (EH-1) should be exercised. If so, the Assistant Secretary or his designee is informed immediately.

CATEGORY II: Addresses a significant risk (but does not involve a situation for which a clear and present danger exists to workers or members of the public) or substantial noncompliance with DOE orders. A concern in this category is to be conveyed to the manager of the facility no later than the appraisal closeout meeting for immediate attention. Category II concerns have a significance and urgency such that the necessary field response should not be delayed until the preparation of a final report and the routine development of an action plan. Any issues surrounding the concern or the suggested response should be addressed during the appraisal or immediately thereafter. Again, consideration should be given to whether facility shutdown is warranted under the circumstance.

CATEGORY III: Addresses significant noncompliance with DOE Orders, or suggests significant improvements in the margin of safety, but is not of sufficient urgency to require immediate attention.

B. Each concern made has also been characterized by the POTENTIAL HAZARD CONSIDERATIONS of the issues addressed or by the significance of its COMPLIANCE CONSIDERATIONS. Some concerns have been characterized in more than one of these groups when applicable. The criteria used are:

POTENTIAL HAZARD CONSIDERATIONS

Level 1. Has the potential for causing a severe injury or fatality, potentially fatal occupational illness, or loss of the facility.

Level 2. Has the potential for causing minor injury, minor occupational illness, major property damage, or has the potential for resulting in or contributing to unnecessary exposure to radiation or toxic substances.

Level 3. Has little potential for threatening safety, health, or property.

COMPLIANCE CONSIDERATIONS

Level 1. Does not comply with mandatory DOE requirements (DOE Orders), prescribed policies and standards, and documented accepted practice (the latter is a professional judgment based on the acceptance and applicability of national consensus standards not prescribed by DOE requirements).

Level 2. Does not comply with recommended DOE reference, standards, guidance, or with good practice (as derived from industry experience, but not based on national consensus standards).

Level 3. Has little or no compliance considerations. Such concerns are based on professional judgment in pursuit of excellence in design or practice (i.e., these are improvements for their own sake -- not deficiency-driven).

ATTACHMENT II

Categorization and Tabulation of Concerns

Using the criteria in Attachment I, all of the concerns have been categorized as Category III for seriousness except for Concerns PP.1-2, PP.4-1, PP.5-2, and ST.6-2, which were designated as Category II for seriousness. PP.1-2 is concerned with the availability of trained personnel to oversee immediate action during emergencies, PP.4-1 addresses the inconsistencies of emergency alarms, and PP.5-2 is concerned with the excessive time for notification of emergency responders. The contractor is developing action plans to respond to these concerns. ST.6-2 is a concern related to a conclusion that BPOI is not in compliance with the Department's Order 5480.3, "Safety Requirements for Packaging and Transportation of Hazardous Materials, Hazardous Substances, and Hazardous Wastes", and is unwittingly committing numerous violations of 49CFR and California state transportation regulations. The contractor subsequently terminated off-site shipments using the cylinders in question and has started a testing program for cylinders. Broader concerns with respect to DOE Order 5480.3 and 49CFR will be studied and appropriate policies and procedures developed.

The concerns were also characterized by relative hazard and compliance considerations. Attachment II.A summarizes the characterization. All of the concerns are tabulated in Attachment II.B., without their supporting basis. The user is cautioned that to understand the full intent of any concern, it is necessary to read its basis in Section III.

II. A. CATEGORIZATION OF CONCERNS

Concern Number	Potential Hazard Level	Compliance Level
PP.1-1	3	1
* PP.1-2	1	1
PP.2-1	1	1
PP.3-1	1	1
* PP.4-1	1	1
PP.4-2	1	1
PP.4-3	1	1
PP.5-1	3	1
* PP.5-2	1	1
OS.2-1	2	3
OS.2-2	2	3
OS.2-3	3	2
OS.3-1	2	1
OS.4-1	2	3
OS.5-1	1	2
OS.5-2	1	2
OS.5-3	1	2
OS.5-4	1	2
OS.6-1	3	3
IH.2-1	1	2
IH.2-2	2	2
IH.2-3	2	2
IH.2-4	2	1
IH.5-1	2	1
IH.5-2	2	1
IH.5-3	2	2
IH.6-1	1	1
IH.7-1	3	1
IH.7-2	2	3
FP.1-1	1	1
FP.3-1	2	1
FP.4-1	2	1
FP.5-1	2	2
FP.6-1	2	1
FP.6-2	2	1
FP.7-1	2	2
FP.7-2	2	2
ST.3-1	3	2
ST.5-1	3	2
ST.6-1	3	2
* ST.6-2	2	1
OP.1-1	2	3
OP.1-2	2	3
OP.3-1	2	2

II. A. CATEGORIZATION OF CONCERNS

Concern Number	Potential Hazard Level	Compliance Level
MA.1-1	2	2
MA.1-2	2	1
MA.3-1	2	1
MA.7-1	3	2
TS.1-1	2	2
TS.2-1	3	3
TS.5-1	2	2
TS.5-2	3	2
TS.6-1	2	2
TS.7-1	3	2
MC.1-1	2	3
MC.2-1	3	3
MC.2-2	3	3
MC.4-1	3	3
MC.5-1	2	2
MC.5-2	2	2
MC.6-1	2	2
MC.7-1	2	2
MC.7-2	3	2
MC.7-3	3	3

*Category II

II. B. TABULATION OF CONCERNS

A. Public Protection

CONCERN: (PP.1-1) III/H3/C1
Safety Analysis Reports for the NPR-1 facilities do not define potential credible accidents or their consequences to provide a basis for emergency planning as required by DOE Orders.

CONCERN: (PP.1-2) II/H1/C1
No system is established to ensure that personnel trained in emergency preparedness will be available to oversee immediate action and manage emergencies on backshifts, weekends, and holidays.

CONCERN: (PP.2-1) III/H1/C1
The Emergency Preparedness Plan is inadequate to support the emergency preparedness program. Further, the plan does not contain all the required elements of the DOE 5500 series of Orders.

CONCERN: (PP.3-1) III/H1/C1
The emergency response drill and exercise program is not fully effective in presenting meaningful situations from which deficiencies and weaknesses can be identified and corrected.

CONCERN: (PP.4-1) II/H1/C1
Emergency alarms for warning, protecting and evacuating personnel are not provided consistently at the NPR-1 site.

CONCERN: (PP.4-2) III/H1/C1
Radio communications systems are not adequate to support support emergency response at NPR-1.

CONCERN: (PP.4-3) III/H1/C1
The system for emergency equipment inventory control at NPR-1 does ensure that emergency equipment is maintained in a state of readiness.

CONCERN: (PP.5-1) III/H3/C1
Event classifications and reporting for accidents are not consistent with DOE orders; also, classification and protective action guidelines are not provided.

CONCERN: (PP.5-2) II/H1/C1
The system in use for notification of emergency responders at NPR-1 takes excessive time.

B. Personnel Protection

CONCERN: (OS.2-1) III/H2/C3
Although subcontractor safety performance data is obtained in bid solicitations and is available from evaluation reports, it is not being used either as part of the procurement criteria for awarding work, or as part of the criteria for terminating a contract.

CONCERN: (OS.2-2) III/H2/C3 — Oversight of subcontractor safety performance is deficient because Contract Technical Representatives are not provided sufficient safety training to enable them to meet technical monitoring responsibilities.

CONCERN: (OS.2-3) III/H3/C2 — The lack of the BLS-OSHA injury and illness reporting and classification guide at NPR-1 is indicative of a less than adequate working document library.

CONCERN: (OS.3-1) III/H2/C1 — BPOI does not meet the intent or the spirit of the Federal Occupational Safety and Health Act in regard to Personal Protective Equipment, specifically safety toe shoes and glasses.

CONCERN: (OS.4-1) III/H2/C3 — The Safety and Health Department does not have the benefits of a standard design criteria manual to assist their construction reviews and field inspections.

CONCERN: (OS.5-1) III/H1/C2 — Delay in the Non-Destructive Testing (NDT) program for some 80 vessels results in operation of the gas plants under conditions of uncertainty.

CONCERN: (OS.5-2) III/H1/C2 — A program for routinely assuring the integrity and capability of permanent type ground anchors prior to use by well servicing units is not in place at NPR-1.

CONCERN: (OS.5-3) III/H1/C2 — The effectiveness of natural draft purging on the LTS-1 and LTS-2 therminol heaters cannot be assured.

CONCERN: (OS.5-4) III/H1/C2 — Readily identifiable safety hazards are not expeditiously corrected and/or controlled.

CONCERN: (OS.6-1) III/H3/C3 — The use of the term non-preventable in regard to injuries/illness can be misinterpreted by supervisors and operators and be counterproductive to the overall safety program.

CONCERN: (IH.2-1) III/H1/C2 — Field inspections and policy enforcement performed by line supervisors are not adequate to assure compliance with safety and health policies and procedures.

CONCERN: (IH.2-2) III/H2/C2 — Oversight of field operations by Technical Assurance is inadequate.

CONCERN: (IH.2-3) III/H2/C2 — No comprehensive personal exposure monitoring program has been established; therefore, exposures to many physical and chemical hazards are unknown.

CONCERN: (IH.2-4) III/H2/C1 — The occupational noise and hearing conservation program does not meet OSHA Standard 29CFR 1910.95, nor does it conform to the UO-NPRC Health and Safety Policy and Procedures Manual. See IH.2-1 and IH.2-2.

CONCERN: (IH.5-1) III/H2/C1 — No carcinogen policy exists as required by DOE 5480.10.

CONCERN: (IH.5-2) III/H2/C1 — While a general policy exists for respiratory protection, no site-specific written program is in place as required by the OSHA Respiratory Protection Standard (29 CFR 1910.134).

CONCERN: (IH.5-3) III/H2/C2 — The 0.07 fibers per cubic centimeter (f/cc) reoccupancy criterion in the NPR-1 35R GAP Asbestos Program is not in accord with the lower, commonly accepted 0.01 f/cc level recommended by EPA in their Guidance for Controlling Asbestos-Containing Materials in Buildings (EPA 500/5-85-024).

CONCERN: (IH.6-1) III/H1/C1 — Labelling and posting for hazards do not meet the OSHA Hazard Communication Standard (29CFR 1910.1200) and DOE 5480.10. See IH.2-1 and IH.2-2.

CONCERN: (IH.7-1) III/H3/C1 — The minimum medical program requirements set forth in DOE 5480.8 are not met.

CONCERN: (IH.7-2) III/H2/C3 — The reduced priority afforded asbestos abatement prolongs hazards relative to potential asbestos exposure and uncertainties regarding equipment integrity. See MC.1-1.

C. Fire Protection

CONCERN: (FP.1-1) III/H1/C1 — The failure to establish a fire protection program at NPR-1 consistent with DOE policy (DOE 5480.7) has resulted in the nonuniform and inconsistent application of fire protection standards that are mandatory as a matter of DOE policy (DOE 5480.4).

CONCERN: (FP.3-1) III/H2/C1 — The fire protection policy at NPR-1 does not comply with the level of fire safety specified in DOE 5480.7.

CONCERN: (FP.4-1) III/H2/C1 — The Construction Department does not require review of field changes for all safety issues, including fire safety, prior to receipt of the field change order approval. The result is that construction can proceed without adequate fire protection consideration.

CONCERN: (FP.5-1) III/H2/C2 — A formal tracking system for monitoring the status of fire safety recommendations in SAR's and other inspection reports does not exist.

CONCERN: (FP.6-1) III/H2/C1 — The lack of automatic suppression, automatic fire detection, and/or passive barriers in the 35R switchyard has the potential for a total loss of power to NPR-1.

CONCERN: (FP.6-2) III/H2/C1 — The Kern County Fire Department's response time of 20 to 25 minutes after notification could result in an unacceptable loss and/or down time.

CONCERN: (FP.7-1) III/H2/C2 — Spacing recommendations of improved risk criteria are not always followed for existing facilities.

CONCERN: (FP.7-2) III/H2/C2 — Recommendations to harden the Control Houses are not contained in SAR II.

D. Transportation and Shipping

CONCERN: (ST.3-1) III/H3/C2 — No policy and procedures are established for transportation and shipping functions.

CONCERN: (ST.5-1) III/H3/C2 — Departmental operating instructions exist only for the transportation of hazardous wastes, not for other hazardous materials.

CONCERN: (ST.6-1) III/H3/C2 — The responsibility and authority for transportation and shipping safety are not clearly established.

CONCERN: (ST.6-2) II/H2/C1 — BPOI is not in compliance with DOE Order 5480.3, with the result that numerous 49 CFR and California state transportation requirements are not being met.

E. Operations

CONCERN: (OP.1-1) III/H2/C3 — Modifications have not been made to the present loading rack facility emergency shut down and grounding systems which would improve operational safety.

CONCERN: (OP.1-2) III/H2/C3 — Safety communications are not effective.

CONCERN: (OP.3-1) III/H2/C2 — Operators fail to use proper facility status controls,i.e., Fire Permit and lock/tag procedures in accordance with Policies. Also see IH.2-1.

F. Maintenance

CONCERN: (MA.1-1) III/H2/C2 — There is almost a total absence of production operation and gas plant piping system and equipment marking and labelling to facilitate both normal and emergency operation and maintenance.

CONCERN: (MA.1-2) III/H2/C1 — Maintenance of the general condition of the facilities is inadequate. Also see Concern OS.5-4.

CONCERN: (MA.3-1) III/H2C1 — Appropriate systems are not in place to assure that NPR-1 unit-owned cranes and lifting equipment are in a safe condition.

CONCERN: (MA.7-1) III/H3/C2 — Formal detailed equipment failure analysis and trending is not being performed.

G. Technical Support

CONCERN: (TS.1-1) III/H2/C2 — The operators at the gas plants are not familiar with the installation and operation of the chemical injection modification which can cause equipment damage and can permit process safety and control to be adversely impacted.

CONCERN: (TS.2-1) III/H3/C3 — Institutionalized programs are not evident to use lessons learned from experience to improve safety.

CONCERN: (TS.5-1) III/H2/C2 — No Material Review Board process is used to disposition nonconforming items and no provisions for independent review of nonconforming items are provided at Receiving.

CONCERN: (TS.5-2) III/H3/C2 — No marking standards are included in Receiving procedures.

CONCERN: (TS.6-1) III/H2/C2 — Calibration activities do not meet the requirements of the QA Manual Section 22.12 with regard to calibration coverage, status marking, and proper documentation.

CONCERN: (TS.7-1) III/H3/C2 — The Nonconformance Reporting system is not implemented and systems used do not meet the DOE Order 5700.6B, "Quality Assurance", for corrective actions.

H. Management Control

CONCERN: (MC.1-1) III/H2/C3 — The consensus process used to develop and implement budget at NPR-1 inhibits the identification, analysis and correction of safety issues.

CONCERN: (MC.2-1) III/H3/C3 — Rigorous evaluation of the causes of injuries are not undertaken to target department-specific solutions, including training.

CONCERN: (MC.2-2) III/H3/C3 — Vehicular accidents are too high by historical standards.

CONCERN: (MC.4-1) III/H3/C3 — A satisfactory safety culture is not evident throughout the NPR-1 site.

CONCERN: (MC.5-1) III/H2/C2 — Management is not providing for formal independent verifications or evaluations to determine the effectiveness of the Environmental, Safety and Health Program in accordance with the DOE Order 5482.1 B and other DOE 5480 series orders.

CONCERN: (MC.5-2) III/H2/C2 — The incident investigation and reporting system is not thorough, based on the review of the LTS-1 incident report, and it is suspected that there is an unreviewed safety issue on the use of wrong bolts in other areas.

CONCERN: (MC.6-1) III/H2/C2 — No control mechanism exists to ensure that all persons who require training receive both initial training and periodic retraining to proper standards and that records are established to document training completion and quality.

CONCERN: (MC.7-1) III/H2/C2 — The present review process described in PPM 110-001 (Series 1) for the preparation, review, approval and issuance of Operating Instructions does not assure appropriate quality and safety reviews.

CONCERN: (MC.7-2) III/H3/C2 — All documents that should be controlled to prevent use of out-of-date or unauthorized manuals, books, papers and drawings are not identified, maintained, revised and distributed.

CONCERN: (MC.7-3) III/H3/C3 — An effective system does not exist to identify pending revisions in the drawing and documentation lists prior to formal revisions.

United States Government ATTACHMENT III Department of Energy

memorandum

DATE: August 3, 1988

REPLY TO ATTN OF: EH-321

SUBJECT: Multidiscipline Technical Safety Assurance Appraisal of the Naval Petroleum Reserves in California, September 26 Through October 7, 1988

TO: J. Allen Wampler, Assistant Secretary for Fossil Energy, FE-1

This is to advise you that the Office of Quality Programs, Division of Quality Verification, is planning to conduct a Multidiscipline Technical Safety Assurance Appraisal of the Naval Petroleum Reserves in California (NPRC) during the period September 26 through October 7, 1988. This appraisal is an extension of the appraisal program that was initiated in 1985 in accord with Secretary Herrington's initiative to strengthen the DOE Environment, Safety and Health Program.

The appraisal will be conducted by a team of qualified specialists from the Office of Environment, Safety and Health (EH) and support contractors. Mr. N. Richard Glover has been designated as the team leader. While the specific make-up of the team has yet to be determined, we envision approximately ten persons with expertise in various areas including fire protection, occupational safety, industrial hygiene, quality assurance/verification, transportation and shipping, and petroleum engineering.

The appraisal will emphasize the evaluation of objective evidence of the safe operating condition of facilities. In this regard, the appraisal team plans an orientation visit to NPRC during the week of September 12, 1988, for briefings by the contractor and site familiarization tours. The appraisal team would then return on September 26 to monitor operations and observe activities related to specific disciplines. They will investigate noted discrepancies, determine the status of hardware and systems, review operating documentation (records, procedures, log books, reports, etc.) and interview operating and management personnel.

Arrangements for the appraisal will be developed with Mr. Charles W. Kauffman, Acting Director, NPRC, by the team leader. Copies of the contractor, Bechtel Petroleum Operations, Inc. (BPOI), policies, plans, organizational charts, manuals and NPRC and BPOI appraisal reports will be requested to be forwarded to Headquarters. During the course of the appraisal, working space at the NPRC site will be needed for the team. The out-briefing is tentatively scheduled for the morning of October 7, 1988. A member of EH senior management will attend the out-briefing.

I appreciate your cooperation and support for this important endeavor.

Ernest C. Baynard, III
Assistant Secretary
Environment, Safety and Health

cc:
Charles W. Kauffman, NPRC

ATTACHMENT IV

TEAM COMPOSITION

MULTIDISCIPLINE TECHNICAL SAFETY ASSURANCE APPRAISAL
NAVAL PETROLEUM RESERVES IN CALIFORNIA

EH Management Oversight	Jerry Hulman Department of Energy Director, Office of Quality Programs
	Neal Goldenberg Department of Energy Director, Division of Quality Verification
Team Leader	N. Richard Glover Department of Energy Division of Quality Verification
Coordinators	Mary Meadows Department of Energy Office of Safety Appraisals
	Barbara Bowers Department of Energy Office of Safety Appraisals
	Patricia Davidson Oak Ridge Associated Universities
Liaison with the Team	Mike Ruiz, Manager Safety and Health, DOE/NPRC
	Jim Killen, Manager Technical Assurance, DOE/NPRC
Public Protection	Fred N. Carlson Private Consultant
Personnel Protection	Donald M. Ross Department of Energy Division of Quality Verification
(Industrial Hygiene)	Gary J. Gottfried Apex Environmental, Inc.
(Occupational Safety)	Patrick J. Doody Apex Environmental, Inc.

Fire Protection	James T. Blackmon Professional Loss Control
	Billy T. Lee Department of Energy Division of Quality Verification
Transportation and Shipping	James M. Shuler Department of Energy Office of Quality Programs
	Robert L. Paullin Engineering Consultant
Operations	Robert J. Cordes Petroleum Consultant
Maintenance	Robert A. Babione ARINC Research Corporation
Technical Support	Henry P. Himpler, Jr. ARINC Research Corporation
Management Control	Leonard M. Lojek Department of Energy Division of Quality Verification
	Harry R. Johnson HJEnergy Company Bartlesville, OK

ATTACHMENT V

Biographical Sketches
of Team Members

Multidiscipline Technical Safety Assurance Appraisal
Naval Petroleum Reserves in California

Name: N. Richard Glover (Team Leader)

Association: DOE Headquarters; Office of Quality Programs

Experience: 29 Years

- o Engineer, Quality Assurance/Safety - ERDA/DOE
- o Branch Chief, Quality Assurance/Safety - Rocky Flats/AEC/ERDA
- o Materials & Test Engineer, Quality Assurance Division - AL/AEC
- o Fire Protection Engineer, Operational Safety - AL/AEC
- o Engineer - Factory Insurance Association

Education: B.S., Mechanical Engineering - University of Maine
M.P.A., Public Administration - University of New Mexico

Other: Certified Safety Professional
Member: American Society for Quality Control
Member: American Society of Safety Engineers
Member: Society of Fire Protection Engineers
Member: American Society of Mechanical Engineers

Name: Robert A. Babione (Maintenance)

Association: ARINC Research Corporation

Experience: 16 years

- Reliability, Availability, and Quality Assurance Engineering and Technical Safety Assessment for Energy Technologies - ARINC Research Corporation
- Fossil Fuel and Nuclear Power Plant Design, Construction, and System Specification and Procurement - W. R. Holway and Associates and Stearns Roger, Inc.
- Geothermal Process and System Development - Coury and Associates
- Nuclear Facility Engineering Support and System Design - EG&G Idaho, Inc., and Westinghouse-Bettis Atomic Power Laboratory

Education: B.S., Mechanical Engineering, Oklahoma State University

Other: Registered Professional Engineer - Colorado and California

Name: James T. Blackmon, Jr. (Fire Protection)

Association: Professional Loss Control, Inc.

Experience: 36 Years

- o Professional Loss Control, Inc., Oak Ridge, TN
  - Senior Engineer: Fire protection engineering and development of hazardous materials courses.
- o H&R Technical Associates, Inc.
  - Wrote procedures, spill prevention and counter measure plans and transportation fire analyses.
- o Union Carbide Corporation - Nuclear Division; Martin Marietta Energy Systems, Oak Ridge, TN.
  - (Y-12 Plant) Draftsman, Senior Draftsman, Engineer, Plant Fire Protection Engineer
  - (ORGDP) Manager Safety Analysis Department
  - (ORNL) Engineering Manager Environmental Department
- o (University of Tennessee) Assistant Professor (Part Time) - Industrial Safety, Industrial Hygiene, Fire Protection, Management of Safety/Health Programs
- o Rocky Flats Safety Advisory Committee - Member

Education: B.S. in Public Administration, University of Tennessee
M.S. in Safety Education, University of Tennessee
Ed.D in Safety/Health, University of Tennessee

Other: Member National Safety Council Chemical Section Executive Committee, Chairman NFPA Vacuum Funn. Sectional Committee

Name: Fred N. Carlson (Public Protection)

Association: Private Consultant

Experience: 27 Years

- o Consultant to the Department of Energy including:
  - Participant in 12 earlier DOE Technical Safety Appraisals
  - Review of N Reactor Safety Enhancement QA
  - Preparation of Emergency Preparedness Orders
- o Consultant to the NRC including:
  - Emergency preparedness appraisals and exercises
  - Detailed Control Room Design Reviews
  - Review of Safety Parameter Display Systems
  - Review of Standard Technical Specifications
  - NRC resident inspector assistance
  - Prepared Chernobyl accident scenarios
- o Consultant to troubled reactor plants for operational reviews.
- o Consultant to FEMA for Nuclear Plant Exercises
- o Westinghouse Bettis Atomic Power Laboratory
  - Manager, two reactor plants
  - Manager, Administrative Services
  - Staff Consultant, Laboratory Performance Evaluation
  - Manager, Engineering
  - Manager, Operations
  - Manager, Training
  - Shift Supervisor
- o Aerojet Nuclear Company
  - Loss-of-Fluid Test Plant operations experience
- o Phillips Petroleum Company
  - Reactor operator and fuel handler
- o Hercules Powder Company
  - Materials Development Engineer & Test Engineer

Education: Ph.D., Mechanical Engineering, Pacific Western University

B.S. and M.S., Mechanical Engineering, University of Idaho

Name: Robert J. Cordes (Operations)

Association: Robert J. Cordes & Associates

Experience: 30 Years

- o Robert J. Cordes & Associates
  - President of company providing petroleum industry safety consultant services, which include expert witness, inspections, investigations, and program development.

- o Marathon Oil Company
  - Safety Supervisor; Safety & Training Coordinator; and Environmental & Safety Coordinator. Responsible for the safety, training, and environmental aspects of Marathon's production operations in the Gulf of Mexico.

  - Senior Risk Engineer. Responsible for inspecting refineries, gas plants, product terminals, fuel gas plants, pipeline terminals and production, both offshore and onshore.

  - Safety Representative: Supervisor of Safety & Security at the 200,000 B/D refinery. Responsible for safety during a $100 million plant expansion.

  - Design Engineer. Involved with selection, design and operation of refinery equipment.

  - Process Engineer. Daily involvement with operations at refinery process units.

Education: B.S., Mechanical Engineering, Washington University in St. Louis, MO

Other: Certified Safety Professional
Active in the API Safety & Fire Protection Committee Meetings
Currently involved with rewrite of ANSI Confined Space Standard, Member ANSI LO/TO Standard Committee
Member: American Society of Safety Engineers

Name: Patrick J. Doody (Occupational Safety)

Association: Apex Environmental, Inc.

Experience: 39 Years

- o Apex Environmental, Inc.
  - Technical audit and safety consultant to the Petroleum Industry.
- o Saravak Shell Berhad (SSB)
  - Performed safety audits (6 months) for Shell International Group Company in Malaysia; drilling and production.
- o Shell Oil Company
  - Safety Engineer Advisor: Senior Staff Technical Specialist; Staff Technical Safety Specialist.
  - Preparation of technical safety manuals and guidelines relating to oil and gas drilling and producing facilities and operations. Recommendations for safe facility designs, work procedures, and training programs.
  - Evaluation and commentary on engineering designs and specifications of onshore and offshore producing facilities, including safety systems and controls, fire protection and emergency evacuation.
  - Onsite safety audits of onshore and offshore drilling and producing installations, facilities and operations; status reporting; recommendations for improvement and regulatory compliance.
  - Accident investigations and report; causal determination and recommendations for correction; legal testimony and depositions.

Education: B.S., Civil Engineering, Genzega University
M.S., Civil Engineering, Harvard University

Other: Chairman, American Petroleum Institute Production Safety Committee, 1980-1987
Member, American Petroleum Institute Production Safety Committee, 1972-1987
Member, American Petroleum Institute Subcommittee to prepared RP 54, "Occupational Safety and Health Drilling and Wall Servicing Units," 1979
Chairman, American Petroleum Institute Task Group to prepare RP 11ER, "Guarding of Pumping Units," 1976

Name: Gary J. Gottfried (Industrial Hygiene)

Association: Apex Environmental, Inc.

Experience: 13 Years

- o Apex Environmental, Inc.
  - Principal, Industrial Hygienist.
  - Responsible for conducting industrial hygiene, public/occupational health and safety and environmental programs.
  - Manages and performs studies involving asbestos programs, indoor air quality, environmental, audits, industry exposure assessment and control, hazard assessment and control, health and safety program development/implementation and industrial hygiene surveys. Concentration in the petroleum industry, utilities, and laboratory environments.

- o Biospherics, Incorporated

  - Vice President, Director, Manager, Industrial Hygienist, Chemist, Laboratory and Industrial Hygiene Services.
  - Responsible for operations of the Industrial Hygiene and laboratory Divisions including management of financial performance, business development, protocol development, productivity, technical direction and supervision of over 100 industrial hygienists, chemists and environmental scientists.
  - Managed major industry and government contract efforts. Performed technical programs as an industrial hygienist and chemist. Led and managed major hazard and environmental assessments, industrial hygiene surveys, laboratory studies, and health and safety programs. Concentration in the petroleum industry, utilities, and manufacturing facilities.

Education: B.S., Chemistry, Purdue University

Other: Certified Industrial Hygienist by the American Board of Industrial Hygiene, 1983
EPA Accredited Asbestos Inspector and Management Planner
President, AIHA, Potomac Section, 1985-1986
President-Elect, AIHA, Potomac Section, 1984-1985.

Name: H. P. Himpler, Jr. (Technical Support/Quality Assurance)

Association: ARINC Research Corporation

Experience: 33 Years

- Test and Evaluation Systems Engineering, Management and Design - Westinghouse Corp. and Raytheon Co.
- QA Project Engineer and Project Management - Westinghouse and General Electric Co.
- Consultant to DOE in QA Program Planning and Auditing - ARINC Research Corporation
- Consultant to U.S. Navy Weapon Systems/Project Management, Planning and Auditing - ARINC Research Corporation
- Electronic Systems Design Engineering - Westinghouse Corp.

Education: B.S., Electrical Engineering, Johns Hopkins University
B.S., Industrial Technology, Rogers Williams College

Name: Harry R. Johnson (Management Control)

Association: HJ Energy Company

Experience: 28 Years

- o HJ Energy Company
  - President. Petroleum engineering; petroleum management; government research strategies; petroleum operations.
- o Keplinger & Associates, Inc.
  - Vice President. Petroleum management; major reservoir studies; increasing oil and gas recovery.
- o Bartlesville Energy Technology Center
  - Director. Enhanced oil and gas recovery; petroleum chemistry; international cooperative agreements.

Education: B.S., Petroleum Engineering, University of Pittsburgh

Other:
Member, Society of Petroleum Engineers of AIME
Member, Enhanced Oil Recovery Committee of the Interstate Oil Compact Commission
Fellow, National Institute of Public Affairs, 1969
Elected to Who's Who in America Science, 1982
Elected to Who's Who in America, 1984

Name: Billy T. Lee (Fire Protection)

Association: DOE/HQ, Office of Quality Programs

Experience: 26 Years

- o Fire Prevention Engineer, Quality Programs at DOE.
- o Project F.P. Engineer, Center for Fire Research at National Bureau of Standards
- o Fire Prevention Engineer, Naval Facilities Engineering Command
- o Chemical Engineer, SRI International and Naval Radiological Defense Laboratory
- o Aerothermal Engineer, Aerojet General and UTC

Education: B.S., Chemical Engineering, University of California (Berkeley)
M.S., Mechanical Engineering, University of Santa Clara

Other: Registered Fire Protection Engineer

Name: Leonard M. Lojek (Management Control)

Association: Headquarters, DOE, Quality Assurance Manager, Office of Environment, Safety and Health

Experience: 29 Years

- Quality Assurance Manager, Assistant Secretary for Environmental, Safety and Health, DOE
- Quality Assurance Program Manager, Assistant Secretary for Fossil Energy, DOE
- Program Manager of R&D efforts in Solvent Refined Coal Conversion Programs (SRC-I and SRC-II), Assistant Secretary for Fossil Energy, DOE
- Project Manager and Project Engineer for disposal of obsolete toxic chemical munitions, Chemical Systems Laboratory, DoD
- Product Engineer for smoke and pyrotechnic chemicals, and for riot control chemicals. Process Engineer for plasticized white phosphorus munitions, Chemical Systems Laboratory, DoD
- Technical Service Engineer for industrial and utility water treatment systems, Calgon Corporation

Education: B.S., Chemical Engineering, Carnegie-Mellon University
M.S.A., Management Engineering, George Washington University

Other: Member of AICHE, ASQC, ADPA

Name: Robert L. Paullin (Transportation & Shipping)

Association: Principal, Paullin Consulting Services

Experience: 38 Years

- Director, Office of Pipeline Safety, U.S. Department of Transportation
- Director, Office of Enforcement & Operations, Materials Transportation Bureau, U.S. Department of Transportation
- Expert witness on pipeline safety to legal clients (research, position development, testimony, assistance)
- Chief Flight Safety Engineer, Douglas Aircraft Company
- Consultant; The Timken Company, Continental Telephone Company, the Institute for Professional Education, Applied Ordinance Technology, Inc., United Technologies, Marks Research, GLH, Inc., James Hubbard, Esquire, Jackson & Kelly, USDA Graduate School, George Washington University
- Director, System Analysis Office, FAA
- Director, Office of Research & Development, U.S. Department of Transportation

Education: DPA, University of Southern California
M.S., Civil Engineering, U.C. Berkeley
B.S., Mechanical Engineering, South Dakota School of Mines & Technology

Other: Registered Professional Engineer, District of Columbia
Commercial Pilot, Single and Multi-engine Aircraft
Member, Professional Societies

Name: Donald M. Ross (Personnel Protection)

Association: DOE Headquarters--Office of Quality Programs

Experience: 45 Years

- o Department of Energy, Headquarters
  - Director, Occupational Safety and Health Division
  - Director, Operational Safety, Health and Environmental Division
  - Chief, Occupational Safety Branch
  - Chief, Health Protection Branch
  - Industrial Hygienist
- o University of Pittsburgh School of Public Health
  - Research Associate
- o Carbide and Carbon Chemical Corporation - Y-12 Plant, Oak Ridge, Tennessee
  - Health Chemist, Health Physics Department
  - Research Associate, Physics Research Group
- o Tennessee Eastman Corporation - Y-12 Plant, Oak Ridge, Tennessee
  - Technical Supervisor, Production Division (electromagnetic separation of uranium)

Education:

A.A., Edinburg, Junior College
B.S., Chemistry, University of Texas
M.P.H., Industrial Hygiene, University of Pittsburgh
ScD., Industrial Hygiene, University of Pittsburgh

Name: James M. Shuler (Transportation & Shipping)

Association: DOE Headquarters, Office of Quality Programs

Experience: 14 Years

- Manager, Packaging and Transportation Safety Program, OQP/DOE
- Radioactive Materials Enforcement Specialist, Office of Hazardous Materials Transportation, U.S. Department of Transportation
- Radwaste/Transportation Specialist Applied Technology of Barnwell, Inc.
- Supervisor of Health Physics/Customer and Compliance Representative, Chem-Nuclear Systems, Inc.
- Health Physics Technician Allied-General Nuclear Services

Education: M.S., Radiation Science, Georgetown University
M.A., Management and Supervision, Central Michigan University
B.S., Botany, Clemson University

Other: Registered Radiation Protection Technologist
Member: Health Physics Society
Member: American Nuclear Society
Member: Association of MBA Executives

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